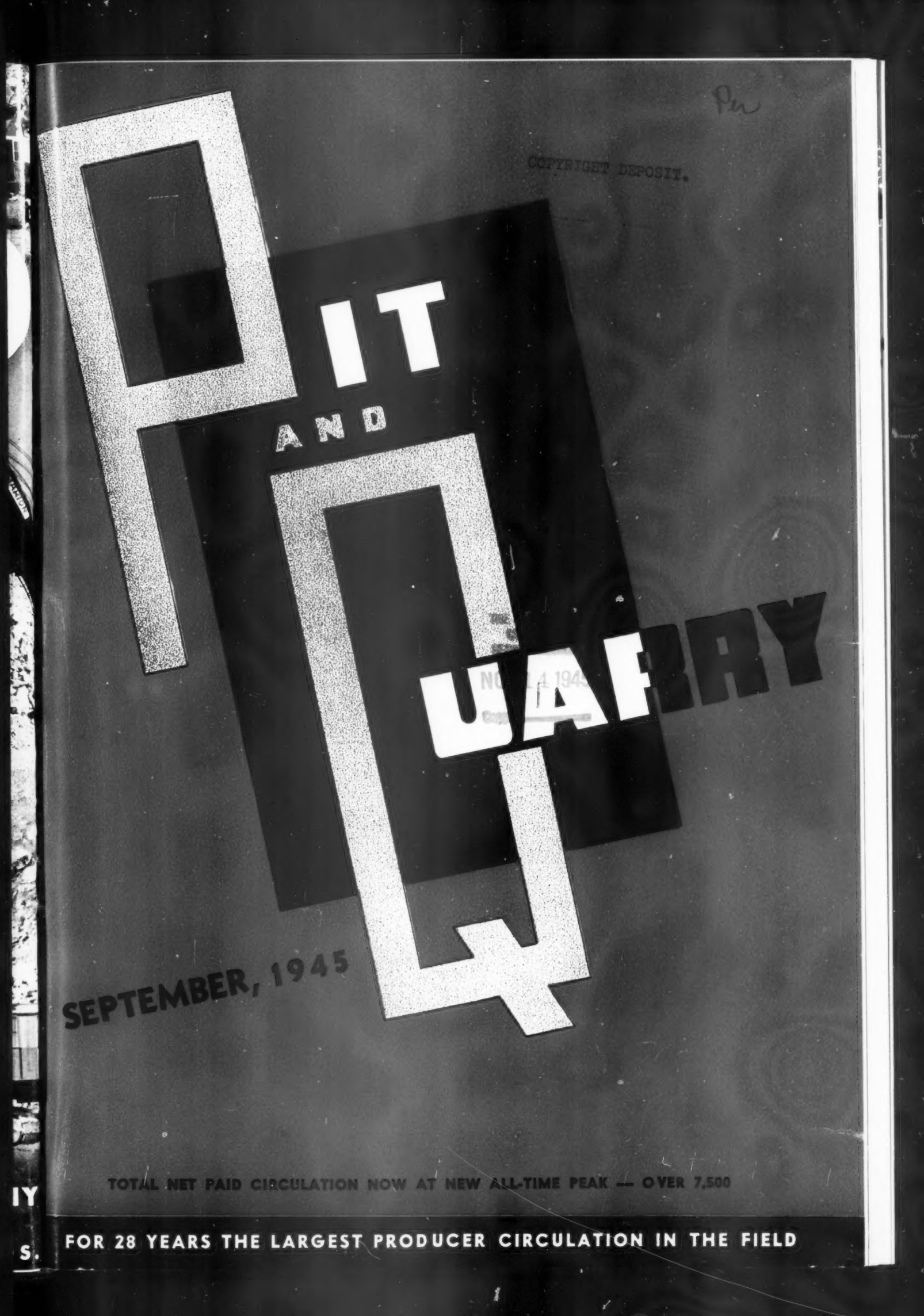
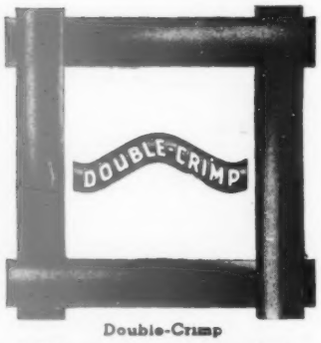

PIT
AND
QUARRY
SEPTEMBER, 1945
TOTAL NET PAID CIRCULATION NOW AT NEW ALL-TIME PEAK — OVER 7,500
FOR 28 YEARS THE LARGEST PRODUCER CIRCULATION IN THE FIELD

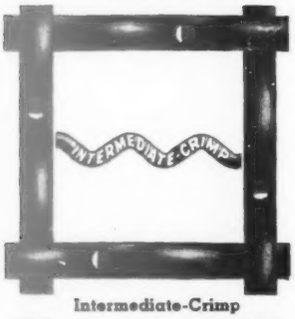
COPYRIGHT DEPOSIT.

NOV 11 1945

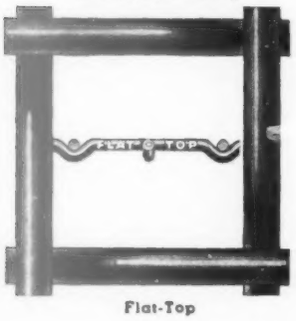


Double-Crimp

Arch-Crimp



Intermediate-Crimp



Flat-Top

"The Perfect"

Wire Cloths and Screens

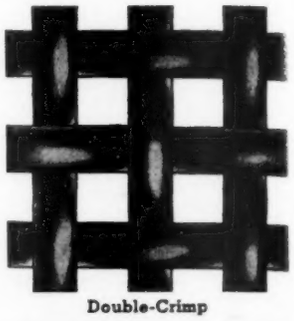
We have been specialists for many years in the making of precision wire cloths, wire screens and woven wire products.

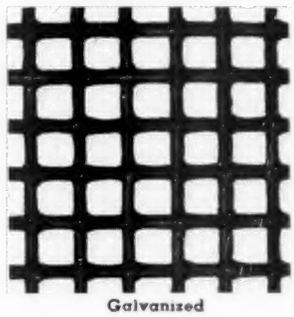
We apply our same precision principles in fabricating wire cloths into finished industrial units, for production or processing equipments or for permanent parts of countless industrial products.

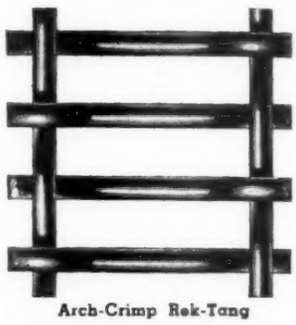
We invite your inquiries for wire cloths of all commercial metals or alloys or weaves, in continuous lengths or cut to size, or processed to meet your individual requirements.

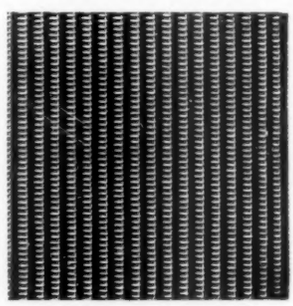
"Perfect" alloys and metals	"Perfect" Wire Cloth weaves	"Perfect" Wire Cloth Processing	"Perfect" Wire Cloth products
Super-Loy	Arch-Crimp	Bending	Baskets
Steel	Coiled	Binding	Circles
Galvanized	Double-Crimp	Brazing	Cones
Tinned	Double-Fill	Calendering	Crates
Stainless Steel	Dutch	Clinching	Cylinders
Nickel-Chromium alloys	Filter	Cutting	Discs
Aluminum	Flat-Top	Dipping	Forms
Brass	Herringbone-Twill	Dishing	Leaves
Bronze	Intermediate-crimp	Flanging	Lengths
Commercial Phosphor	Rek-Tang	Flattening	Panels
Copper	Selvage-Edge	Forming	Pieces
Monel Metal	Straight-Warp	Framing	Racks
Nickel	Stranded	Galvanizing	Ribbons
Any special alloys available in rod or wire form	Sta-Tru	Painting	Rolls
	Triple-Warp	Shearing	Sections
	Twilled	Slitting	Segments
	Twisted-Fill	Trimming	Spaces
	Twisted-Warp	Arc-Welding	Strips
		Gas-Welding	Template shapes
		Spot-Welding	Trays

We will follow your specifications and blue-prints exactly as your production engineers have prepared them—or we will submit suggestions for your approval.


Double-Crimp


Galvanized

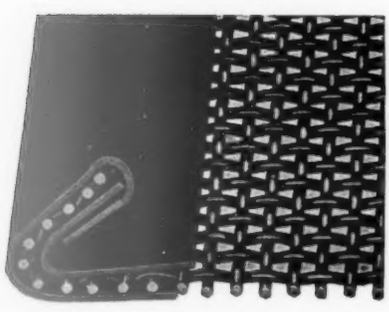

Arch-Crimp Rek-Tang


Dutch Weave

The LUDLOW-SAYLOR WIRE COMPANY

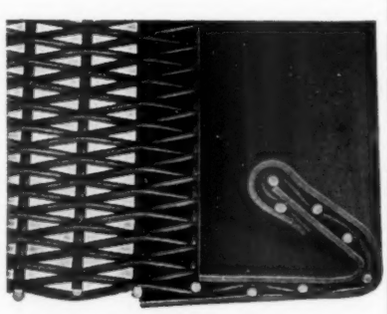
Newstead Avenue & Wabash Railroad

ST. LOUIS 10, MO.



LUDLOW-SAYLOR PRECISION FABRICATING makes vibrating-screen decks and jackets that are easily handled — quickly installed — need fewer adjustments and renewals.

Illustrations suggest only a few of the many available types of wire cloths and woven wire screens, which may be custom-finished with attachments to fit your particular processing installations.



Twice MODERNIZED with EASTON SEMI-TRAILERS at COLUMBIA

"Red" Heise manages the Krause No. 1 plant at Columbia, Illinois—a property of the Columbia Quarry Company of St. Louis. Here EASTON 10-ton semi-trailers modernized the haulage operations in 1938, replacing 5-yd. cars and locomotives.

By 1944 the production schedule called for larger tonnages at the crusher. EASTON 17-ton capacity semi-trailers of modern design were installed to speed the haulage cycle.

This fleet of five EASTON TR-13 units is now delivering 1,250,000 tons annually with top efficiency and low maintenance. The average round trip haul at Krause No. 1 is exactly one mile.

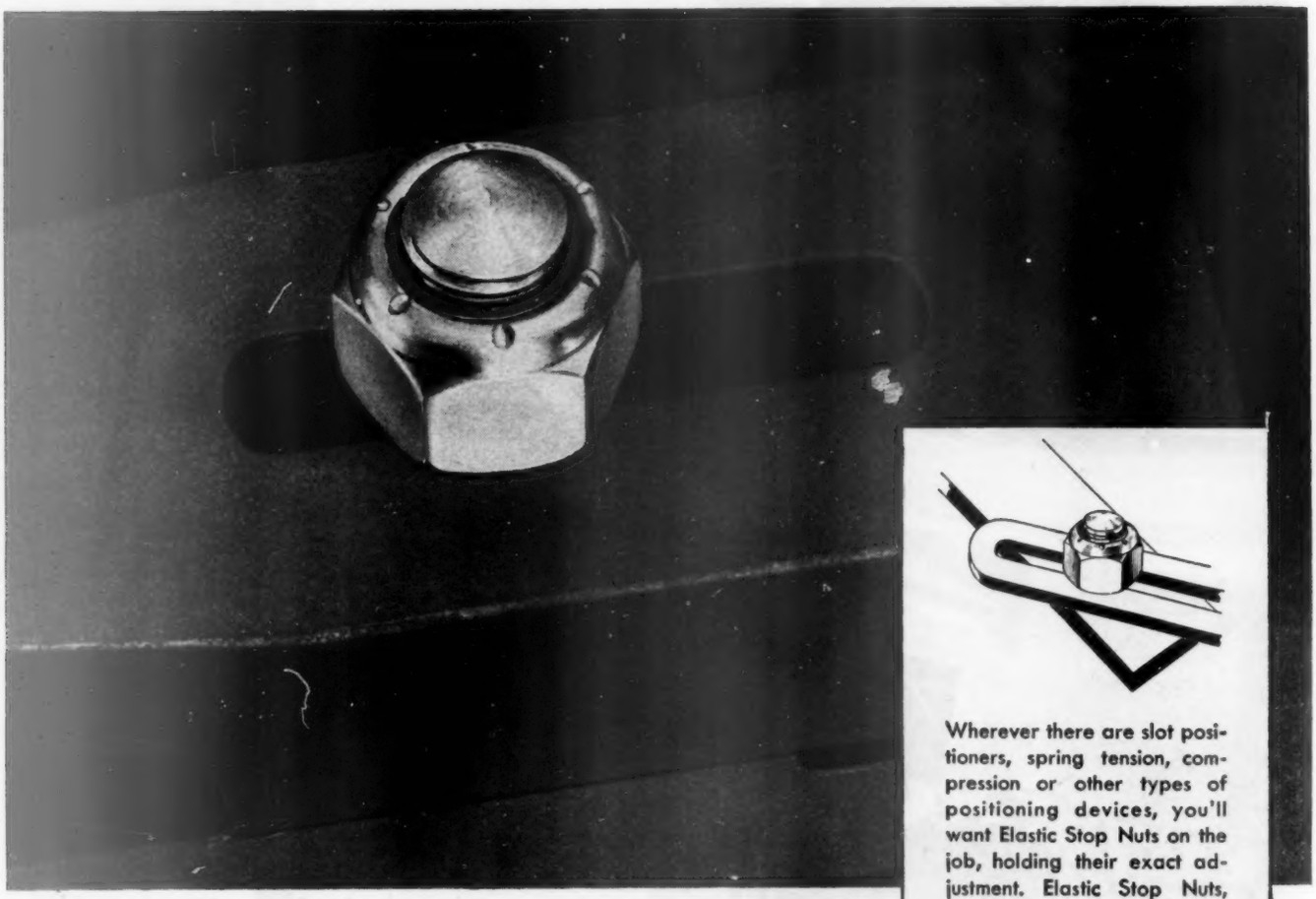
If you have a haulage problem it will pay you to write to: Engineering Counsel, Easton Car & Construction Company, Easton, Pa.

EASTON
INDUSTRIAL CARS
TRUCK BODIES · TRAILERS
ELECTRIC LIFT TRUCKS

B-1018

PIT AND QUARRY, September, 1945. Vol. 38, No. 3. Published monthly by the Complete Service Publishing Company, 528 South Clark Street, Chicago 5, Ill. Subscription price $2 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 50 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the Act of March 3, 1897.

THIS NUT *Knows its place*



Wherever there are slot positioners, spring tension, compression or other types of positioning devices, you'll want Elastic Stop Nuts on the job, holding their exact adjustment. Elastic Stop Nuts, because they successfully resist the effects of vibration, shock, impact and other loosening influences, are ideal for positive maintenance of position.

It Stays Where It's Put

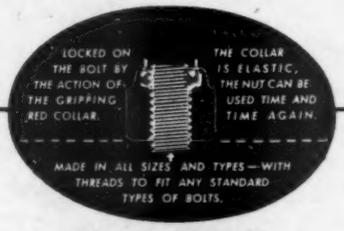
You'll always find the Elastic Self-Locking Stop Nut where you place it, because this nut always stays put. The Elastic Stop Nut holds an adjustment with a sure grip whether seated against a surface as in the slot positioner illustrated above or unseated on a threaded part.

The Elastic Stop Nut uses its head —because built into it is a red collar. This is an elastic compression collar that molds itself to the individual threads of the bolt, locking tight.

You need no jam nuts, cotter pins or other locking auxiliaries when you use Elastic Self-Locking Stop Nuts. They refuse to loosen, creep or "back off" under the toughest, most critical operating conditions. Yet they never rust or freeze in place and can be easily removed when necessary.

Proved in billions of wartime applications, Elastic Self-Locking Stop Nuts give definite insurance against loose nuts and consequent delays, breakdowns and extra maintenance work. From delicate, precise aircraft installations to heavy-duty tank installations, these nuts with the red elastic collar have shown their gripping power. Elastic Self-Locking Stop Nuts are the sure way to greater safety, economy and reliability.

LOOK FOR THE RED COLLAR
THE SYMBOL OF SECURITY


LOCKED ON THE BOLT BY THE ACTION OF THE GRIPPING RED COLLAR.
THE COLLAR IS ELASTIC. THE NUT CAN BE USED TIME AND TIME AGAIN.
MADE IN ALL SIZES AND TYPES—WITH THREADS TO FIT ANY STANDARD TYPES OF BOLTS.

ESNA
TRADE MARK

ELASTIC STOP NUT CORPORATION OF AMERICA

Plants at: Union, New Jersey and Lincoln, Nebraska

Sales Office: 1060 Broad Street, Newark 2, New Jersey

It's all wet—but it delivers the goods

THE main conveyor belt at one of the largest sand and gravel plants in Texas operates 10 hours a day — *and under the stock piles is exposed to dripping moisture 24 hours a day, every day.*

Working in a continuous shower bath like this is enough to make any conveyor belt give up — but this 985-foot-long Goodyear Style B belt has been carrying wet sand, gravel and rock up to four inches in size for more than twelve years. During that time, it has carried more than FOUR MILLION TONS of this wet material, without a single shutdown because of belt failure.

Such standout service attests the value of Goodyear's unique mildew-inhibited construction — a plus that assures long, trouble-free life under severest moisture conditions.

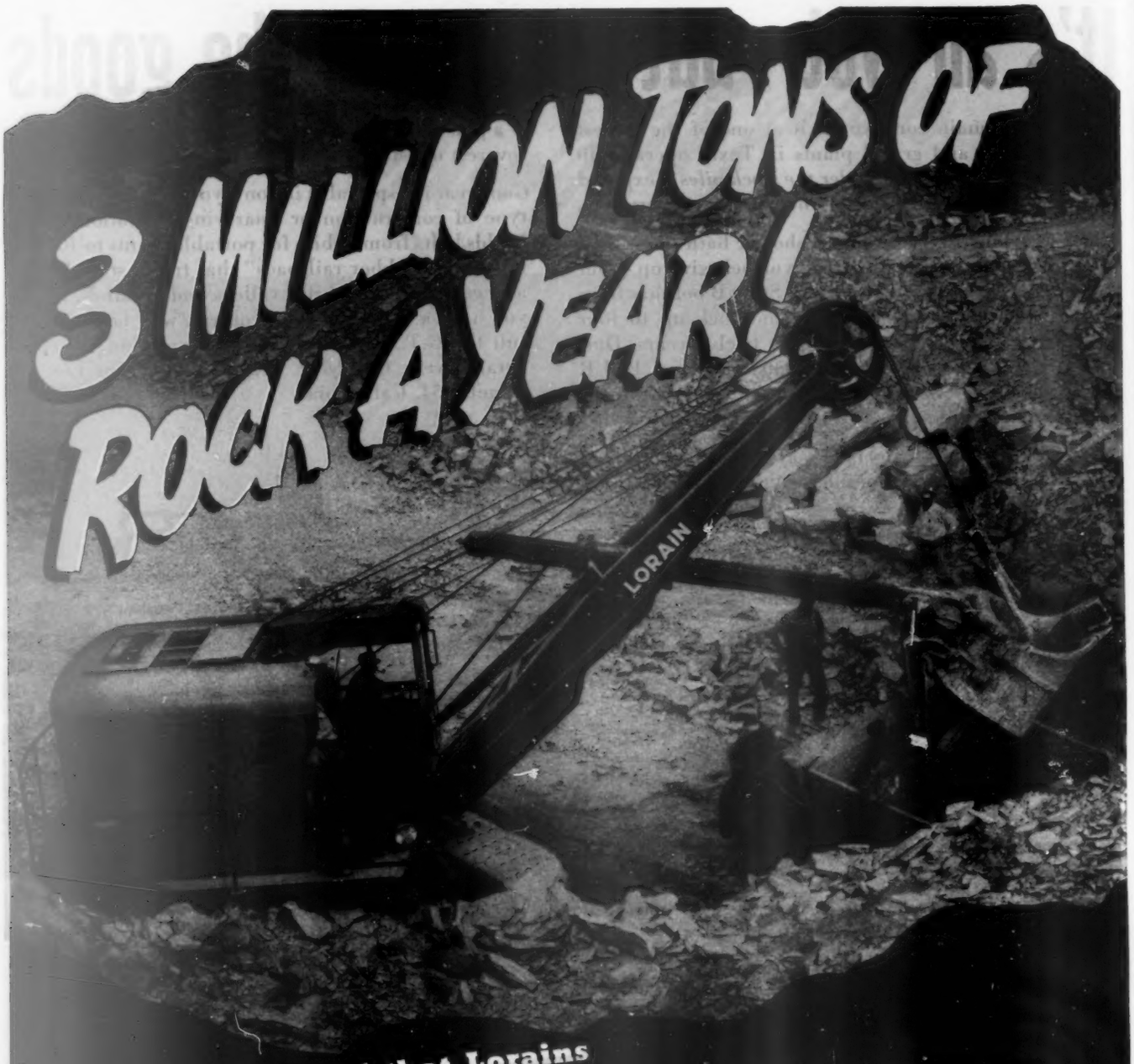
Goodyear is a specialist in conveyor belts for every type of construction or quarrying operation — builds belts from babies for portable plants to 10-mile-long "rubber railroads" that travel straight as a crow flies over hills, valleys and flatlands. If you have a conveyor belt problem, why not consult the G.T.M.—Goodyear Technical Man? For details, write Goodyear, Akron 16, Ohio, or Los Angeles 54, California.

***UNDER THIS STOCK PILE** the conveyor belt is in a continual shower bath — must withstand constant dampness plus constant abrasion.*

FOR HOSE, BELTING, PACKING, MOLDED GOODS AND TANK LININGS built to the highest quality standard in the world, phone your nearest Goodyear Industrial Rubber Products Distributor.

***ANGLING STEEPLY FROM STOCK PILE** to [illegible] tipple, this Goodyear Style B Conveyor Belt has operated without interruption for more than 12 years, carried more than 4 million tons of highly abrasive materials.*

3 MILLION TONS OF ROCK A YEAR!



Job-Tested Proof that Lorains Are Money-Makers in Rock . . .

A 3,000,000 ton payload of crushed rock in a single year. That's the story of Lorain performance and production on this quarrying operation* where each of five 2 yd. Lorain 82's averaged over 50,000 tons of rock a month for twelve consecutive months.

A steady rock diet like this means plenty of power—and Lorains are long on power which is applied through: (1) The Center Drive design which permits ganging-up full engine power on any one operation; (2) the Hydraulic Clutch that cushions impacts and shocks, absorbs stresses and strains, prevents engine stall and protects cable life.

Keep the 2 yd. Lorain 82 (with hydraulic clutch) in mind for those jobs where big production means bigger profits. For complete details get in touch with your Lorain distributor, now!

THE THEW SHOVEL COMPANY • Lorain, Ohio

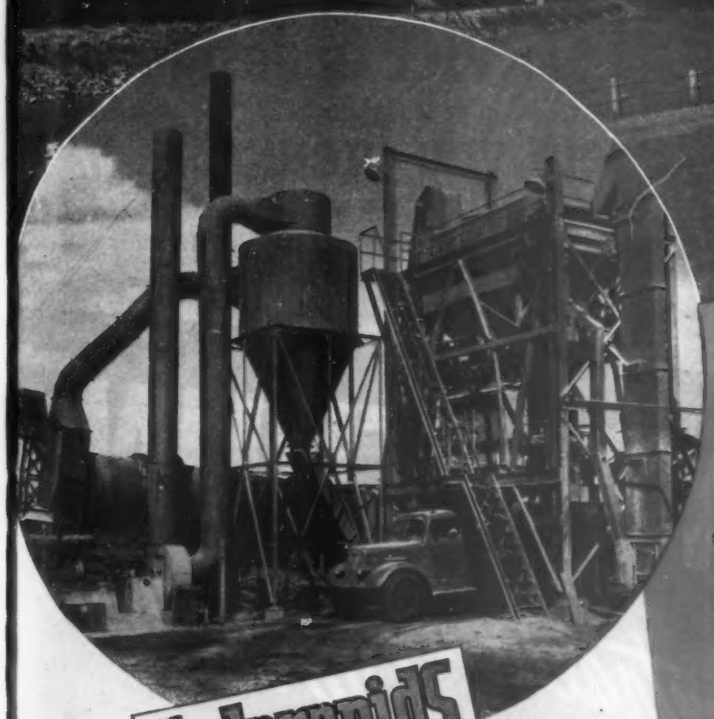
*Location on request

Reg. Trade Mark

thew-Lorain

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

Build Better Roads to SEE AMERICA!



Cedarapids
Built by IOWA

The beauty and grandeur of America's scenic wonderlands will beckon travelers soon again when America is once more "a nation on wheels". Many more miles of smooth, all-weather black-top roads will be built, providing both employment and enjoyment for millions of Americans.

Contractors who look ahead, plan ahead, will be the ones who get the bigger, more profitable road contracts. The owner of a Cedarapids Hot or Cold Mix Asphalt Plant is completely prepared to bid on any bituminous job that comes along. Flexible, easy to set up or knock down, these asphalt plants are sure and simple in operation. Grading and proportioning are accurate beyond the tolerance of the most rigid highway department specifications and outstanding performance is attained through the efficient coordination of all parts. Properly balanced, the feeder, driers, elevators, screening, batching and mixing units all work together in close harmony for fast, smooth and accurate production. Let your Iowa dealer tell you more about these profit-making asphalt plants.

BATCH TYPES OR CONTINUOUS MIX TYPES—all sizes are available.

THE IOWA LINE

of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS
STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS—TRAPS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

IOWA MANUFACTURING CO.
Cedar Rapids, Iowa

UPS DAILY

SPEEDS JOB COMPLETION! From field-tested maintenance schedules to expert technical aid, every detail of Socony-Vacuum's COMPLETE LUBRICATION SERVICE is designed to save time . . . help you break production records!

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates:
Magnolia Petroleum Co., General Petroleum Corp. of Calif.

OUTPUT!

THE MOST COMPLETE lubrication service ever offered to contractors—that's the kind Socony-Vacuum brings you! Here's how it helps you *underrun* time estimates—finish ahead of contract dates.

Out in the field, it means fewer breakdowns. Because our line of quality lubricants is complete, you get exactly the right oil or grease for every application—no matter how unusual.

Expertly scheduled on-the-job deliveries save further field interruptions, help reduce inventory problems. And now that you can get *all* your lubricants from just *one* source, you save time in your office, too. No need for special orders, follow-ups.

In your maintenance department, the Socony-Vacuum Representative expedites work many ways! For instance, he'll supply you with job-tested maintenance schedules and help your men adapt them to your specific requirements. He's also equipped to call in engineering help when needed . . . to instruct "green" help on the Do's and Don'ts of Correct Lubrication for all your machines.

All through your operation, Socony-Vacuum's Complete Lubrication Service for Contractors saves time and money—speeds output . . . so why be satisfied with fuels and lubricants alone!

"ON YOUR STAFF—BUT NOT ON YOUR PAYROLL"—
Your Socony-Vacuum Representative

CORRECT LUBRICATION FOR EVERY PART OF EVERY MACHINE YOU OPERATE . . .
PLUS
1 ENGINEERING HELP on time-losing operating problems; 2 TESTED MAINTENANCE SCHEDULES that minimize service man-hours—keep equipment on the job;
3 PROMPT, DEPENDABLE DELIVERY—a reliable, on-the-job service that eliminates inventory problems for you!

TUNE IN "INFORMATION PLEASE"—MONDAY EVENINGS, 9:30 E.W.T.—NBC

In Mines and Quarries

EUCLIDS

move thousands of EXTRA tons every month

● Built for tough off-the-highway hauling, Rear-Dump and Bottom-Dump EUCLIDS have stepped up production noticeably and reduced hauling costs on scores of open-pit mining and quarry operations. Here are some of the more important reasons for the *plus* performance of Euclids:

Rugged simplicity — Designed for dependable performance as well as appearance, there are fewer wearing parts; maintenance costs and down-time for repairs are reduced to a minimum.

Capacity — Euclid models have payload capacity ranging from 15 to 30 tons; favorable ratio of unit weight to payload capacity means more pay tons hauled on every trip.

Speed — top speeds loaded of 21.8 to 34.4 m.p.h., depending on model; fast travel time results in many more pay load trips per hour than can be made with slower equipment.

Versatility — Efficient for hauling any material on any length haul; handle overburden, rock, coal, ore and other materials loaded by shovels, draglines, transfer bins, mobile loaders and other modern digging and loading equipment.

If you are interested in increasing your production and profits, check Euclid performance on any job, and write for complete information.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

EUCLID

SELF-POWERED
HAULING EQUIPMENT
For EARTH . ROCK . COAL . ORE

ANNOUNCEMENT

CANADIAN-VICKERS, LTD. OF MONTREAL

are now manufacturing, in Canada . . . . Traylor Mining, Crushing, Smelting, Chemical Processing and Cement Manufacturing Machinery.

Canadian-Vickers, Ltd., through its vast manufacturing facilities and its staff of engineers are in a position to give expert and helpful service to Canadian operators in the above fields.

TRAYLOR

ENGINEERING & MANUFACTURING CO.

MAIN OFFICE AND WORKS — ALLENTOWN, PENNA., U.S.A.

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3416 Empire State Bldg.

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919 Chester Williams Bldg.

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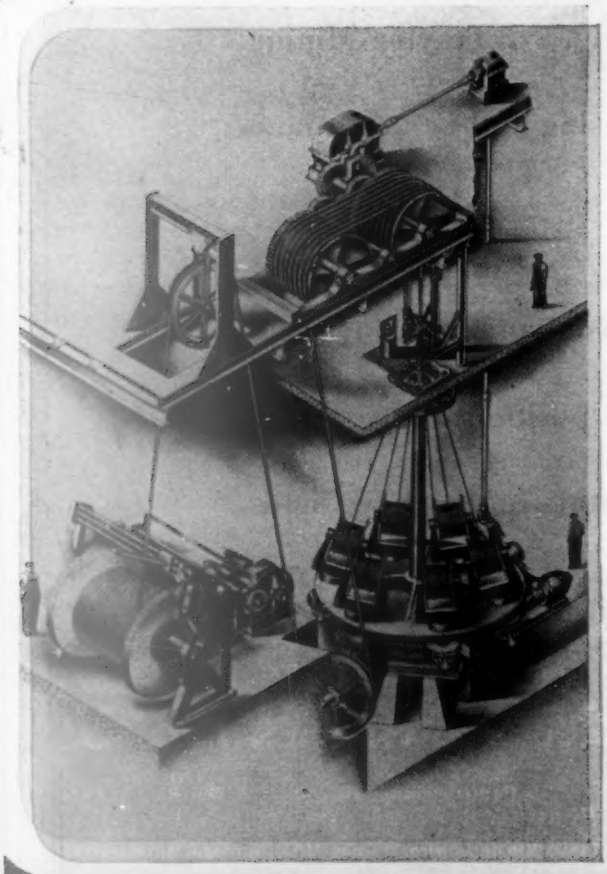
S. 2707 Rhyolite Rd.

B. C. EQUIPMENT CO., LTD.
551 Howe St., Vancouver, B. C.

Export Department—104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Rio de Janeiro, Buenos Aires, Santiago, Antofagasta, Oruro, Montevideo, La Paz

WHICH
WILL BUILD ROADS
NO PROVISIONS MADE FOR FUNDS
NO PLANS OR PROGRAM
UNITED STATES OF COMPLACENCY
HEADING FOR FEDERAL PREEMPTION INSTEAD OF FEDERAL COOPERATION



New War-Borne Techniques Will Make America's Competitive System of Private Enterprise More Efficient Than Ever Before!

Although geared largely to war production, the Union Wire Rope organization is prepared to shift overnight to fill home-front requirements in wartime tempo. For instance, at the left is shown a giant wire rope closing machine developed by Union Wire Rope engineers in the war emergency. It is three stories high, has a range of ⅜ inch to 4 inch wire rope and a maximum capacity of 27 tons of wire rope in one continuous length. Union engineers have devised many other new facilities and techniques with which to serve private enterprise more efficiently than ever before. Our war work has been such that our craftsmen will not have to relearn their skills.

union Wire Rope

UNION WIRE ROPE CORPORATION

2132 Manchester Avenue Kansas City 3, Missouri

Tulsa 3 Houston 11 Chicago 6 Salt Lake City 13 New Orleans 16
Monahans, Tex. Portland 10, Ore. Ashland, Ky. Atlanta 1

Let's pull together

FOR THIS KIND OF AN AMERICA

Americans have called upon their national leaders for a far-reaching highway system, a network of airports, and a long-studied program of flood control and land conservation. Why? Because they are the keys that will open new frontiers and because they are among the few proper and fertile fields for the investment of public funds.

Our leaders in Congress have responded by approving our largest highway and flood control programs and doubtless will respond with an airport program.

But, the approved programs are not being pushed to final*ization* in many states. The National Highway Program, for example, is based upon state responsibility for plans by State Highway officials and funds by State Legislatures. No citizen can afford to let this sound program go by default. If there is a lag in your theatre of operations, make it your concern. Send the coupon for "The Road Ahead", published by the American Road Builders' Association, and "Put Your Town on the Air Map", published by the Personal Aircraft Council of the Aeronautical Chamber of Commerce of America.

UNION WIRE ROPE CORPORATION, 2132 Manchester Ave., Kansas City 3, Mo.

☐ Send a Free copy of book entitled "The Road Ahead"
☐ Send a Free copy of book entitled "Put Your Town on the Air Map"

*Name*_____

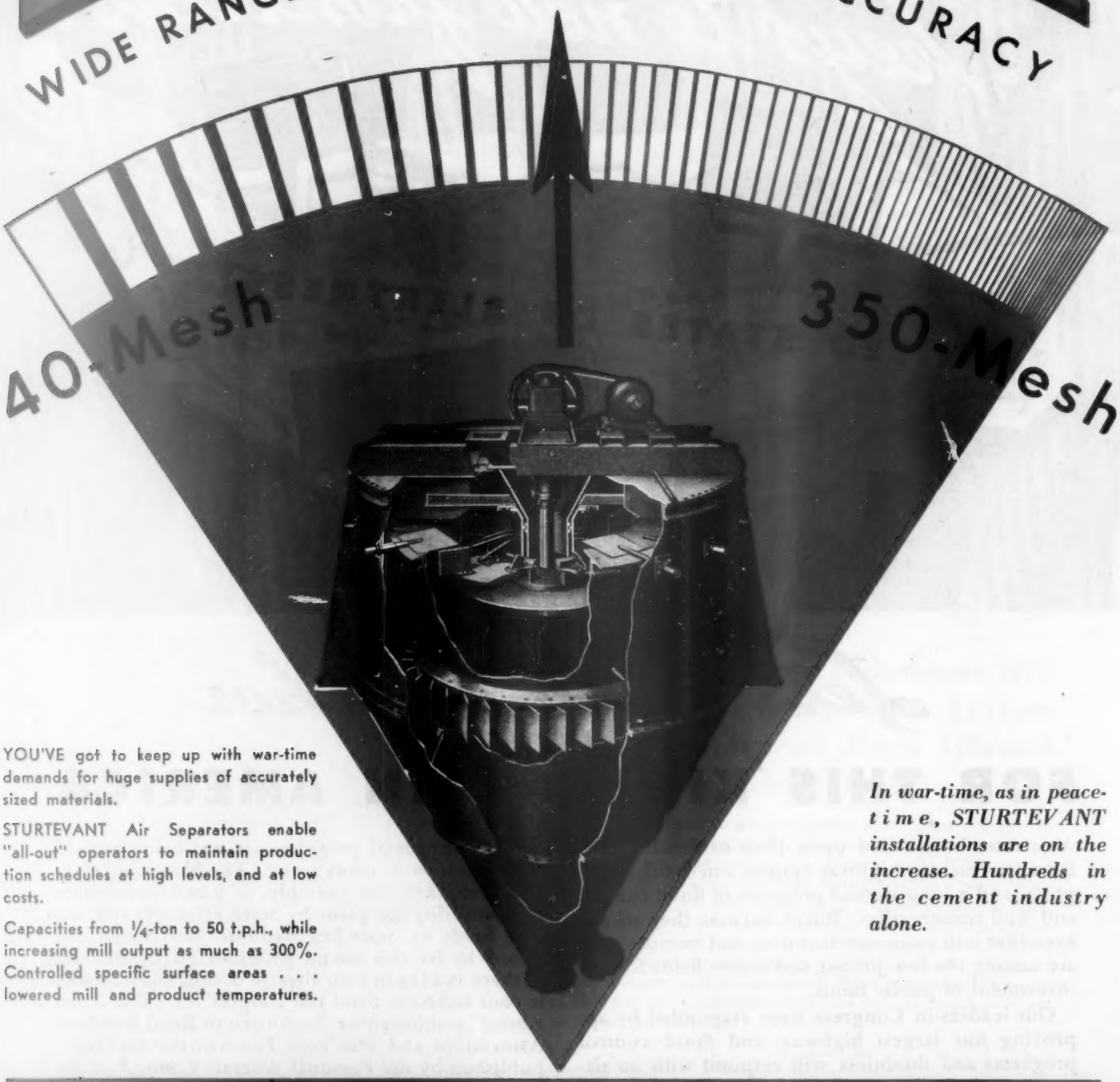
*Firm*_____

*Address*_____ *City*_____ *Zone*___ *State*_____

D-45

STURTEVANT

WIDE RANGE • *Fine Sizing* • ACCURACY



YOU'VE got to keep up with war-time demands for huge supplies of accurately sized materials.

STURTEVANT Air Separators enable "all-out" operators to maintain production schedules at high levels, and at low costs.

Capacities from ¼-ton to 50 t.p.h., while increasing mill output as much as 300%. Controlled specific surface areas . . . lowered mill and product temperatures.

In war-time, as in peace-time, STURTEVANT installations are on the increase. Hundreds in the cement industry alone.

STURTEVANT MILL CO. HARRISON SQUARE BOSTON 22, MASS.

SAFE · SIMPLE · STURDY · FOOLPROOF · DEPENDABLE

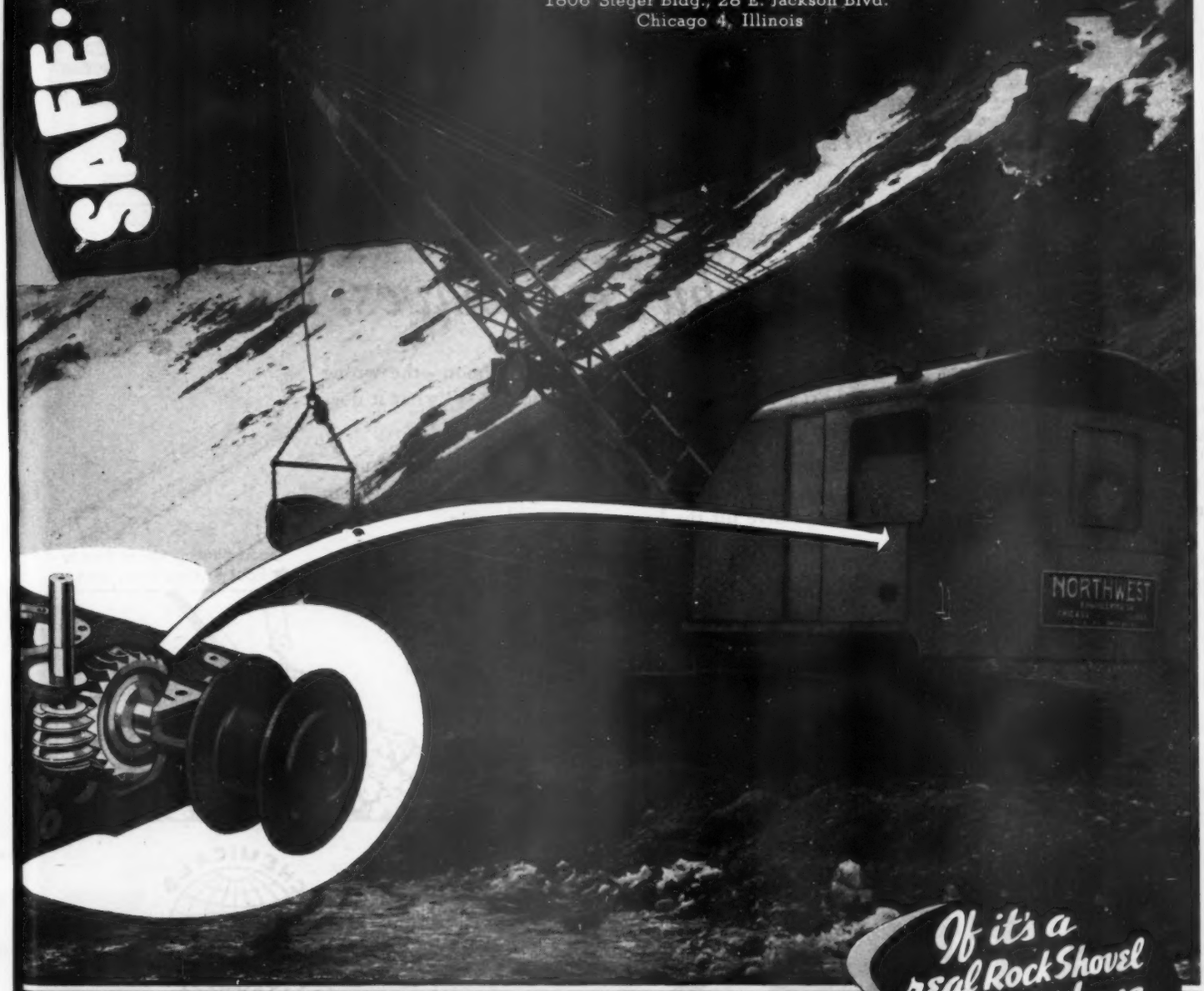
Here's another Northwest feature—the Northwest Worm Boom Hoist—that assures greater safety when your Northwest is serving as a Crane or Dragline on the tailings pile, at the power plant or on any of the many odd jobs found around every mine. It is typical of the better construction of Northwest Shovels, Cranes and Draglines.

The Northwest Worm Boom Hoist is smooth in operation—Boom up—Boom down!—there is no jumping, no chattering—just velvet action—under power *both up and down!* An automatic brake prevents running down the Worm and *dropping the Boom.* It is fully enclosed and needs no adjustments.

That's the way Northwest builds them—safer, easier to operate, easier to care for—a little more costly to build—but more trouble-free for you.

When making your plans for the future secure details on the size of Northwest to suit your problem.

NORTHWEST ENGINEERING COMPANY
1806 Steger Bldg., 28 E. Jackson Blvd.
Chicago 4, Illinois



NORTHWEST

Convertible for any Mining, Material Handling or Excavation Problem

If it's a real Rock Shovel you won't have to worry about output in dirt

"Common Sense Applied to Spending"

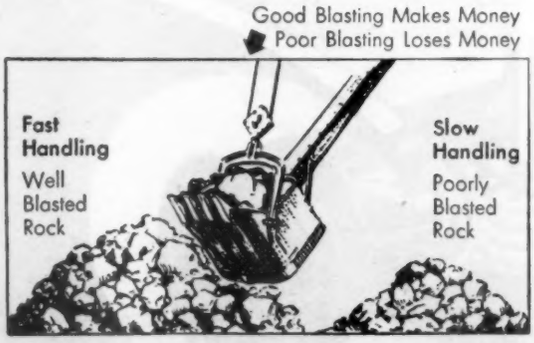
. . . *that's how to buy explosives, too*

Buying hats and buying explosives have one thing in common—the wrong purchase is no bargain. Price is not the first consideration; it is "what it does for you" that really counts.

So saving on the initial cost of explosives is a false kind of thrift. Often it *increases* expense. It's just common sense to analyze your blasting problem —then choose the *right* explosive for the best results in blasting.

Efficient blasting insures good fragmentation. It increases production—gets more work out of your equipment. Poor breakage is hard on the shovel—lowers daily production.

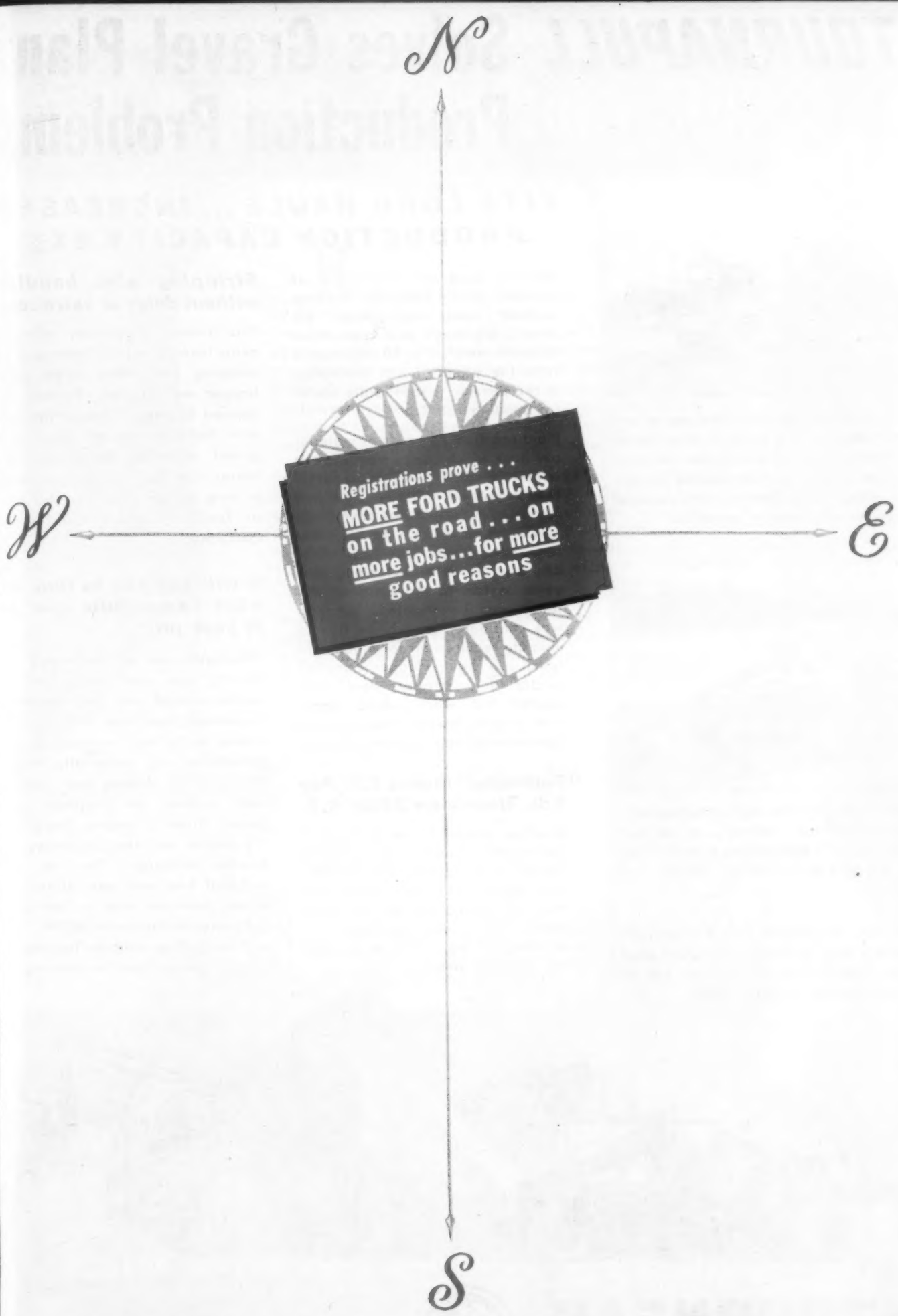
Your Atlas Representative is a competent blaster. He has 120 different explosives at his command—backed by years of company experience on the best way to use them. Put his up-to-date "know how" to work for you. It will help you produce *real* operating economies.



ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • ***Offices in principal cities*** • ***Cable Address—Atpowco***


N
W
E
S
Registrations prove . . .
MORE FORD TRUCKS
on the road . . . on
more jobs . . . for more
good reasons

TOURNAPULL Solves Gravel Plant Production Problems

You can shift Tournapulls to stripping at any ime as needed without move-in delay, taking out a nearby load of overburden between gravel trips as often as plant capacity permits. Positive ejection by tailgate insures clean bowl necessary for interchanging operations.

ournapulls can work the deposit horizontally, o bring in selective pit material... or can load own the face of a bank, taking part of a load f sand and part gravel, where shovel-mix is equired.

ermont Sand and Gravel Co.'s Bellows Falls lant, where one Tournapull increased plant rocessing capacity from 75 to 121 cu. yds. of it material per hour on longer hauls. PQ6

FITS LONG HAULS ... INCREASED PRODUCTION CAPACITY 61%

Vermont Sand and Gravel Co. of Bellows Falls, Vermont, supplies washed sand and gravel for streets, highways and commercial concrete work on a 50-mile radius from the plant. Sand, stockpiled in the summer, is sold in the winter for sanding roads.

Plant required 75 yards of material per hour which comes from deposit under 18 to 24" of loam overburden in the flat areas. Haul had increased to 2300 feet round trip making it impossible to fill plant requirements with crawling tractor and 8-yd. scraper. Extending conveyor system to shorten haul distance was investigated, but cost was considered prohibitive due to ultimate requirement for 4,000 foot round-trip haul. Bigger crawling tractor and scraper were considered but work would again soon extend beyond their production capacity and economical costs.

Tournapull Moves 121 Pay Yds. Hourly on 2300' R.T.

Solution proved to be a Super C Tournapull, using old crawling tractor as a pusher. The Tournapull delivers 11 pay yards per trip, averages 11 trips per hour on a 2300' round trip haul . . . delivers 121 pay yards of material per hour to plant.

Stripping also handled without delay or extra cost.

This excess production allowed extra time to switch Tournapull to stripping overburden when plant hopper was loaded. Further, increased Tournapull production permits building up of sand and gravel stockpiles faster and releases the Tournapull and Dozer to help out on other contract jobs of Frank Whitcomb Construction Company.

It will pay you to find out what Tournapulls can do in your pit.

Investigate use of Tournapull for loading your sand and gravel. It combines load and haul functions. Investment, operating and maintenance costs, and manpower requirements are materially lower than cost of loading and hauling with shovels or draglines and trucks. There is greater flexibility, it's easier and less expensive to handle stripping. You can get material from any part of the pit at any time you want it. See your LeTourneau distributor NOW. He will be glad to estimate Tournapull production and costs on your work.

LETOURNEAU
PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

JOB-PROVED
Over 3500 Built and Shipped

TOURNAPULLS*

*Trade Mark Reg. U. S. Pat. Off.

OUR PART IN A VICTORY SHIP . . .

Here is the LST-512, one of the millions of tons of fighting ships in history's greatest battle fleet. This invasion carrier, salvaged after being crippled in action off Normandy, has BWH hose and other products among its equipment and will cruise mid-west waterways from Duluth to New Orleans during the months from June to September. It will stop at many different cities along the Great Lakes and the Ohio and Mississippi Rivers for public demonstrations of amphibious warfare.

In March of 1944 she joined a convoy bound for England and since that time has crossed the Atlantic twice, crossed the English Channel a score of times, and was beached on the Normandy coast on D-Day and was in the midst of heavy bombing and shelling—though never struck—landing a large number of American, British and Canadian troops in France.

We are proud to have had a part in helping to equip this and other ships that have enabled American assault troops to overcome our German enemies and to punch their way to the very threshold of Japan's homeland.

BUY WAR BONDS

OFFICIAL U. S. NAVY PHOTOGRAPH

BOSTON WOVEN HOSE & RUBBER COMPANY

Works: CAMBRIDGE, MASS. Postal Address: Box 1071, BOSTON 3, MASS., U. S. A.

BOSTON WOVEN HOSE AND RUBBER COMPANY

NORDBERG
PROCESSING MACHINERY

for Mines, Cement Mills, Stone, Chemical and Metallurgical Plants

Crushing

Jaw and Gyratory primary crushers and Symons Cone and Impact Crushers for fine reduction cover the entire range of crushing operations.

Grinding

Ball, tube, rod and compartment mills are offered in larger sizes — for wet and dry grinding operations.

Drying • Calcining • Cooling

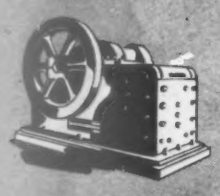
Rotary dryers, kilns and coolers for cement, lime and sintering operations.

Screening • Feeding

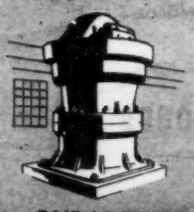
Vibrating grizzlies and screens and feeders for heavy duty operations offer a wide choice of equipment for control and sizing of materials.

Smelting

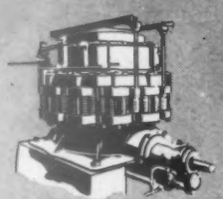
Smelting furnaces, copper converters, rotary and straight line casting machines for the metallurgical industry



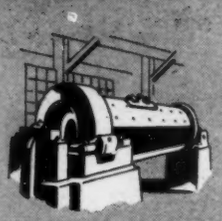
JAW CRUSHERS



GYRATORY CRUSHERS

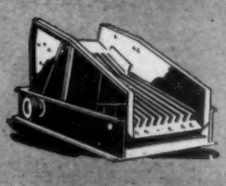


SYMONS CONE CRUSHERS

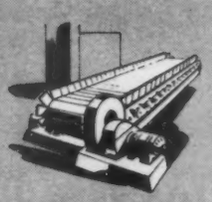


GRINDING MILLS

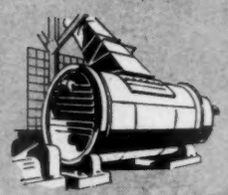
ROTARY KILNS DRYERS • COOLERS



GRIZZLIES AND SCREENS



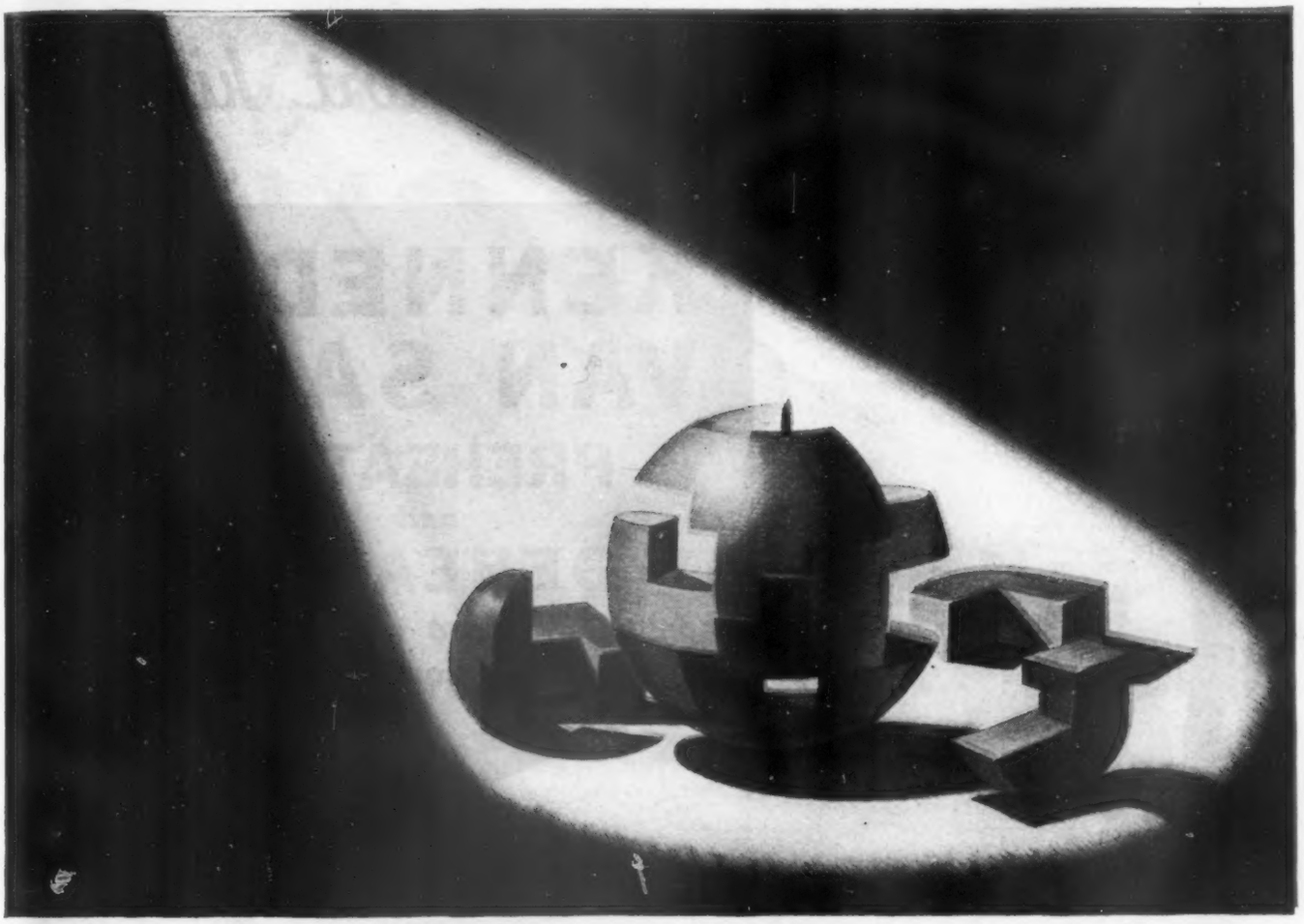
FEEDERS



COPPER CONVERTER

When contemplating machinery for the processing of ores and minerals, whether for a new plant in the future or the modernization of an existing plant, investigate this line of machinery for process work.

NORDBERG PROCESS MACHINERY DIVISION
60 E. 42nd Street, New York City
of
NORDBERG MFG. CO.
Milwaukee 7, Wisconsin



The right wire rope is the *Solution* to every rope problem!

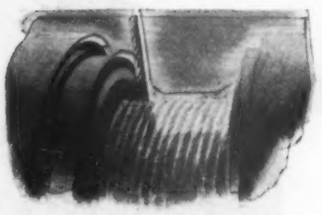
Selection of the *right* wire rope determines true rope economy. Every wire rope design is planned to resist a certain type of destruction.

For instance, few but heavy wires in the strands make a rope that long withstands abrasion but is not built to take bending. The rope made of many small wires resists bending but can't take too much abrasion.

Longest wire rope service results from the correct combination of resistance characteristics to meet the destructive forces present in each application.

Long, safe, economical life is *engineered* into every Wickwire Rope through modern wire-steel research and control—in our own laboratory. Here, the *right* characteristics can be accurately predetermined by scientific metallurgic control over the admixture and blending of steel-making elements.

Wickwire Rope quality is further safeguarded by the exact wire drawing procedure to fit the type of service which each finished wire rope is to perform.



Thousands of wire rope users—old hands and new—have found our specially prepared manual, "Know Your Ropes," valuable in making their work easier and prolonging rope life. It contains 78 "right and wrong" pictures, 40 wire rope life savers, 20 diagrams, tables and charts. Send for your FREE COPY today.

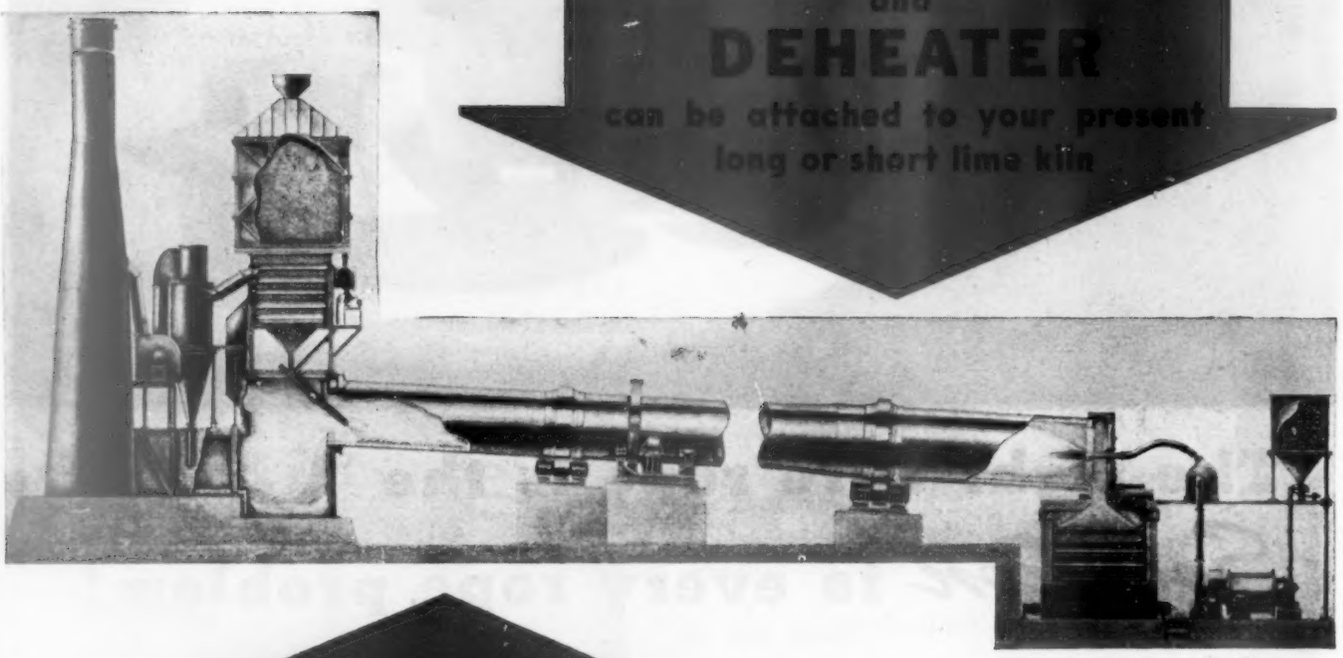
WICKWIRE SPENCER *Steel Company*

500 FIFTH AVENUE, NEW YORK (18), N. Y.

ABILENE (TEX.) • BOSTON • BUFFALO • CHATTANOOGA • CHICAGO • CLINTON (MASS.) • DETROIT • HOUSTON • LOS ANGELES • PHILADELPHIA • SAN FRANCISCO • TULSA • WORCESTER

Save your long or short kilns

KENNEDY-VAN SAUN
PREHEATER
and
DEHEATER
can be attached to your present long or short lime kiln

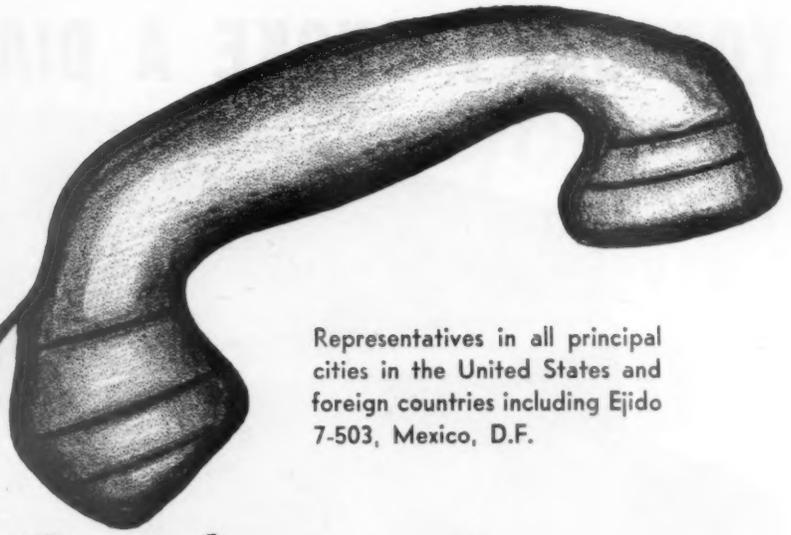


Your present LONG OR SHORT LIME KILN can be brought up to date to give you MORE LIME and BETTER LIME when equipped with a Kennedy Preheater, Soaking Pit and Deheater than a long or short Rotary Kiln of the same diameter when not so equipped, and you will do it with 40% less fuel per ton of lime. We are making high grade lime in short kilns with less than 5,600,000 BTUs per ton of lime.

Call us today. Our engineers will be at your disposal without obligation to you.

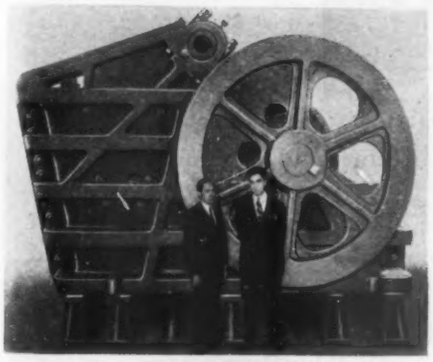
KENNEDY-VAN SAUN MFG. & ENG. CORPORATION

. . . Call KVS



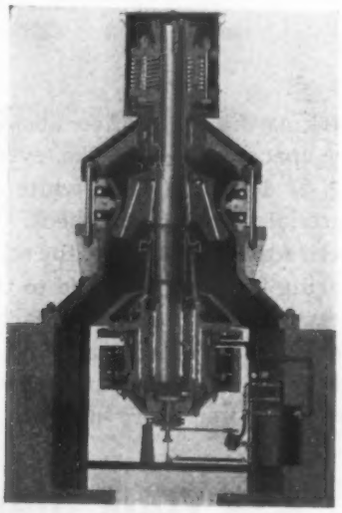
Representatives in all principal cities in the United States and foreign countries including Ejido 7-503, Mexico, D.F.

for Information on PROCESSING EQUIPMENT for Pit and Quarry Operators



KVS swing jaw Crusher. Extra heavy duty type. Handles large tonnages of the toughest rocks. In sizes for all needs.

KVS Gyratory Gearless Short Shaft Standard Crusher for primary reduction. A high efficiency unit.



A 4½ KENNEDY BALL BEARING GEARLESS CRUSHER with a Synchronous Motor built in its pulley. This machine shows 80% saving in cost of maintenance, 50% saving in power, and 50% greater capacity than other crushers of same size.

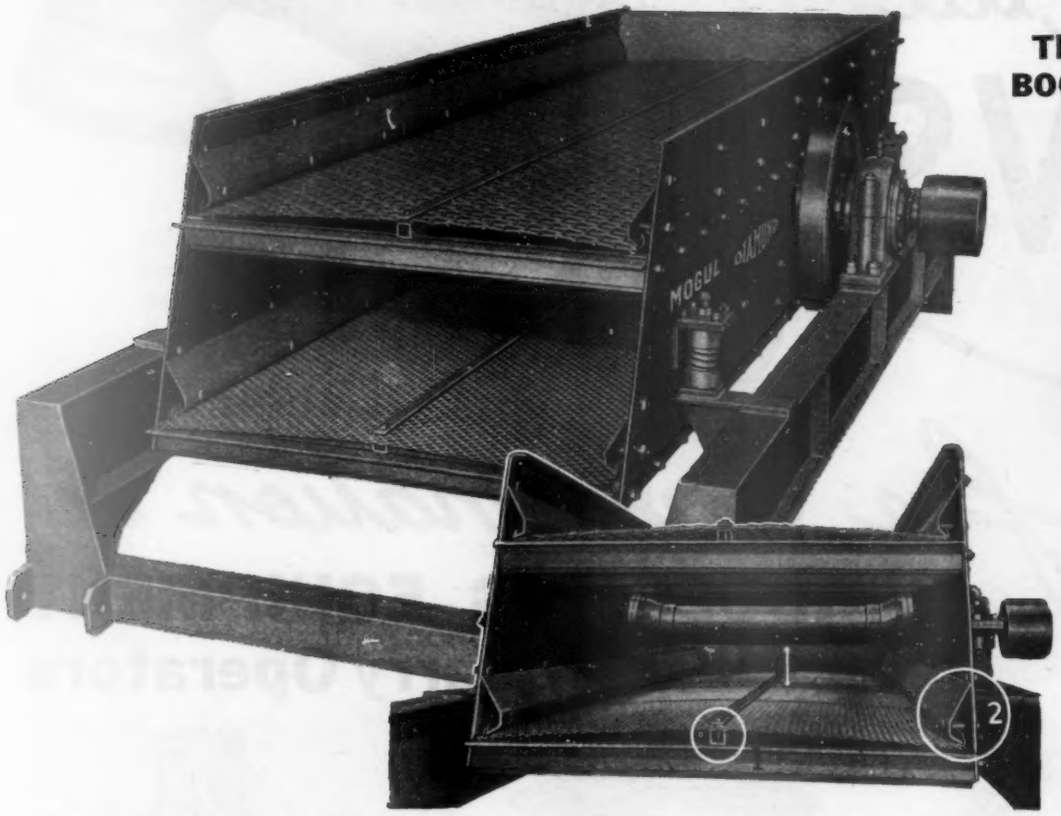
KENNEDY Products include a complete line of equipment for burning, crushing, pulverizing, sand washing, and screening.

Write for Bulletins

ARMY E NAVY

2 Park Avenue, New York 16, N.Y. Factory: Danville, Pa.

YOU CAN'T CHOKE A DIAMOND VIBRATOR!



THIS NEW FREE BOOK TELLS WHY

It tells you the many reasons for the acknowledged superiority of the DIAMOND vibrator, and it tells you more. It illustrates and describes DIAMOND scalping and combination scalping and scrubbing screens, and DIAMOND drag washers. Send to us, or ask your DIAMOND dealer for a copy of Bulletin D-45-V.

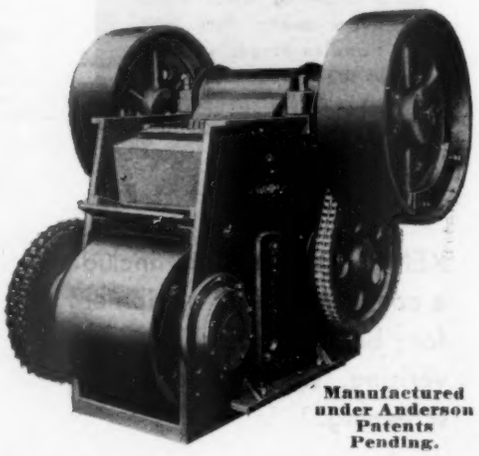
Look at the illustration above. Study it. Note the free space between decks, even with the shaft housing, as denoted by the white arrow. This gives the material the room it needs. The marvelously balanced *forward* action of the screen keeps the material moving from the feed end to the open end. Figure 1 shows how the screen on each deck is raised in the center to force the material to spread towards the sides. Users will invariably tell you that they consistently "get more material through their DIAMOND vibrators" which means greater capacity, important savings in time, and consequent savings in operating costs.

Figure 2 shows the DIAMOND method of screen locking. Here, the curved side plate holds the turned edge of the screen, and tightening bolts pulling straight out draw the screen taut without the constant cutting action so often found with other methods. This means considerably less screen replacement. Bulletin D-45-V fully illustrates and describes these and other important features. Ask for it.

ASK YOUR DIAMOND DEALER ABOUT THE NEW "DUAL-ACTION" CRUSHER

Get the facts about this startling new development in crushing. A primary (jaw) and finishing (roll) crusher in ONE UNIT! About half the weight, equal or greater capacity, dependable uniformity of product—these and other features make "DUAL-ACTION" the outstanding development in crushing in the past thirty years. Ask for Bulletin D-45-M which gives all the facts and information on the use of the "DUAL-ACTION" for replacement on your present used plant bringing its weight well within minimum load limits anywhere on any highway. Other dependable DIAMOND products are:

Jaw and roll crushers . . . Conveyors, screens . . . Bucket elevators . . . Feeders, hoppers, bins . . . Portable, ROTOR-LIFT plants . . . Complete quarry plants.



Manufactured under Anderson Patents Pending.

DIAMOND

DIAMOND IRON WORKS, INC.

AND THE MAHR MANUFACTURING CO. DIVISION

1801 SECOND STREET NORTH MINNEAPOLIS 11, MINNESOTA

Model F8C Cam and Roller Hoist with Type W12 Body. Capacity 5 cu. yds.

One-way side dump body with dual hydraulic hoist. Automatic downfolding side.

Always Good!

NOW BETTER THAN EVER

GAR WOOD

HEAVY-DUTY EQUIPMENT

For nearly three decades Gar Wood inventive genius, advanced engineering and high quality manufacture provided the world's finest medium and heavy-duty construction equipment. Then came the period when Gar Wood bodies, hoists, winches, etc., were made for one customer—Uncle Sam. Notable mechanical improvements and even greater strength were engineered and built into these rugged units to give them a new high in performance and efficiency.

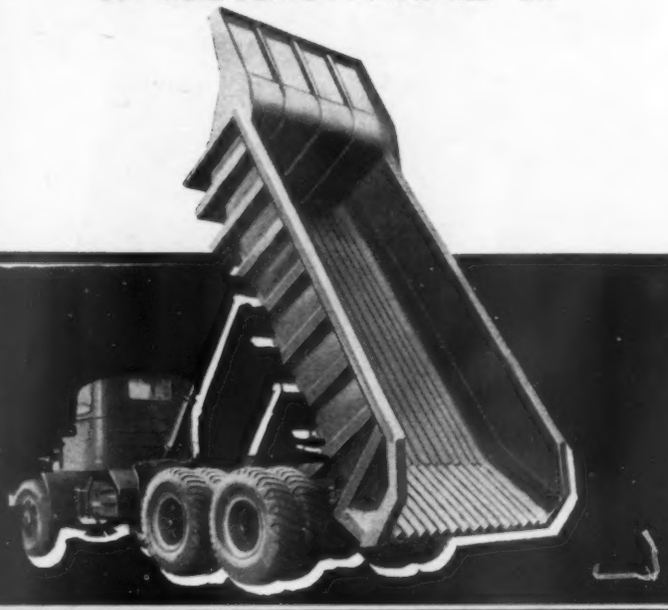
And now, with civilian production about to be resumed, Gar Wood will build still better heavy-duty equipment . . . . with greater values and longer life than ever before.

BUY MORE BONDS . . . AND KEEP 'EM

↑ 4-Wheel Cable Scraper—capacities 11, 15, 20 and 25 cu. yds. Rolling ejection. Accurate spreading.

← Tractor or utility winches.

Extra heavy duty type → X112 rock body with open or scoop-end. Hydraulic, twin telescope hoist Model T-4440.



GAR WOOD INDUSTRIES, INC.

DETROIT 11, MICH. WORLD'S LARGEST MANUFACTURER OF TRUCK AND TRAILER EQUIPMENT

HOISTS AND BODIES • WINCHES AND CRANES • TANKS • ROAD MACHINERY • HEATING EQUIPMENT • MOTOR BOATS

PLAN FOR BETTER EQUIPMENT, TOO!

Model T4 TRAXCAVATOR removing overburden at a California quarry

The T4 TRAXCAVATOR loads 300 tons of limestone per day in this Iowa pit

One of two T4's that load as much as 75 tons per hour each in this Kansas limestone mine

YOUR plans to reduce production costs will get off to a flying start if you decide to TRAXCAVATE, for it's the modern material handling method that has enabled many other pits and plants to cut costs. TRAXCAVATORS, the dependable tractor excavators, combine in one machine the usefulness of many — will strip overburden, load from pit or stockpiles, carry and stockpile, maintain haulage roads, remove snow, do drawbar work. There's a wide choice of models with bucket sizes from ½ to 2½ cubic yards. Your TRACKSON-"Caterpillar" dealer will be glad to give you the complete facts, or write to TRACKSON COMPANY, Dept. PQ-95, Milwaukee 1, Wis.

MULTIPLE ENGINES PROVED on the job

Diesel power for variable loads, through multiple-engine hook-ups, is nothing new with "Caterpillar." Fourteen years show hundreds of such "Caterpillar" Diesel installations, in all types of industries, where their advantages are being proved daily.

In the installation pictured here, two "Caterpillar" Diesel D8800 Engines are belted to common shafting for driving a limestone pulverizer.

Either engine can be cut out for "running light"—with the usual throttle control providing further flexibility for matching the needed power precisely to the load. The advantages are obvious:

You waste no fuel. You have constant standby power—continued operation, even while one engine is being serviced or repaired. You have no heavy installation or rigging-up expense. For your power-plant is readily portable—in convenient "packages" instead of a ponderous single unit of similar total capacity.

And, "Caterpillar" Diesel Engines have still other advantages—individually: Through highly efficient air, oil and fuel filters, and inbuilt seals, all vital parts are thoroughly protected against dust, dirt and grit. Fuel and maintenance costs are amazingly low. Stamina and long life are definite "Caterpillar" qualities.

• SIX SIZES — 34 to 190 hp. — applicable to multiple hook-ups of 2 to 20 units — in many combinations of sizes.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR DIESEL ENGINES

REG. U.S. PAT. OFF.

TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

The discharged veteran wears this emblem. Remember his service and honor him.

12 reasons why CLEVELAND SINKERS are PREFERRED...

1. Drop forged construction insures super-strength.
2. End-seating valve (used on most models) improves with use, prevents greater air consumption with long wear.
3. Big oil reservoir holds enough for four hour's steady operation.
4. Lubrication of rifle nut and bar prolongs their life 50%.
5. Complete lubrication of all parts of the machine insures longer wear of all moving parts.
6. Chrome plated spacer wears 3 times longer, insures full cushion on front end, avoids piston and side rod breakage.
7. Large areas of face contact hold parts in line, minimize wear at joints.
8. Floating chuck clutch prevents binding of piston.
9. Well designed exhaust port prevents freezing.
10. Throttle detents fully enclosed and well oiled.
11. Four pawl rotation—rugged and reliable.
12. Goose neck swivel air connection.

Many types, ranging from 32 to 78 lbs. in wet or dry construction, fully described in Bulletin 122. Ask for it!

MODEL H111

MODEL H10

MODEL H66

CLEVELAND ROCK DRILL DIVISION

THE CLEVELAND PNEUMATIC TOOL COMPANY

CABLE ADDRESS: "ROCKDRILL" • CLEVELAND 5, OHIO

Leaders— in DRILLING EQUIPMENT

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DIAMOND G MULTI-CLAMP

The Clamp of a thousand uses...

Here's a new clamp that meets the needs of many industries . . . a clamp that solves scores of problems quickly and economically!

The new Diamond G MULTI-CLAMP instantly FITS and HOLDS rubber hosing, metal pipe, tubing, cables and other equipment in a vise-like grip. No wrench, no screw-driver, no disassembling necessary. The patented worm-type self-locking screw assures uniform instant adjustment. Each standard MULTI-CLAMP covers a wide range of sizes and adjustments. Continuous "gear-action" solid band prevents leakage or unequal pressure at any point!

The Diamond G MULTI-CLAMP is corrosive-resistant and meets current Army-Navy specifications. It can be used repeatedly and is practically indestructible. Mechanically held and securely welded . . . a double safety feature! For special purposes, various types of inserts, extra wide bands of metal, plastic or rubber are available.

See the MULTI-CLAMP in action . . . for automotive, aviation, railroad, marine, electrical, hydraulic, pneumatic, electronic, household use and general plant applications. Sample on request.

Easy to Install—no disassembling

Double Safety Feature—mechanically held *and* welded

GEORGE K. GARRETT CO., INC.
1421 CHESTNUT STREET, PHILADELPHIA 2, PA.

DIAMOND G PRODUCTS

It pays to be a Bemis Multiwall Paper Shipping Sack Customer!

For years, cement manufacturers have said, "It pays to be a Bemis Multiwall Paper Shipping Sack Customer." Wartime conditions brought this fact home in hundreds of instances. • Perhaps the most important reason is that Bemis made an unusual record in fulfilling shipping promises and in maintaining quality under wartime conditions.

Bemis Multiwall Paper Shipping Sacks

6 PLANTS

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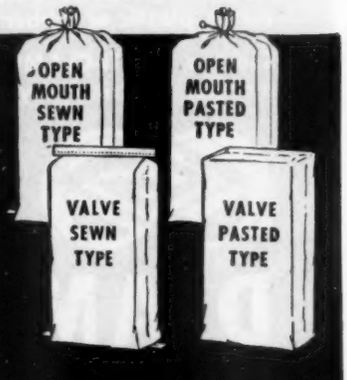

Replace Your War-Worn Hose

Get hose that's JOB-ENGINEERED for your needs. Get this great new POSTWAR Hose NOW available from

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Job-Engineered FOR INDUSTRY

HEWITT RUBBER *of Buffalo*

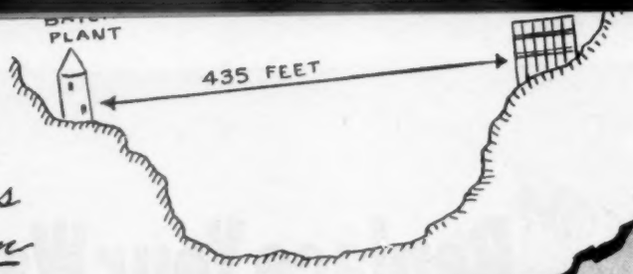
JOB-ENGINEERED INDUSTRIAL HOSE · BELTS · MOLDED GOODS

Specify "Hewitt" for quality industrial rubber products. Phone the Hewitt distributor listed in the Classified Section of your telephone directory . . . or write Hewitt Rubber Corporation, 240 Kensington Avenue, Buffalo 5, New York.

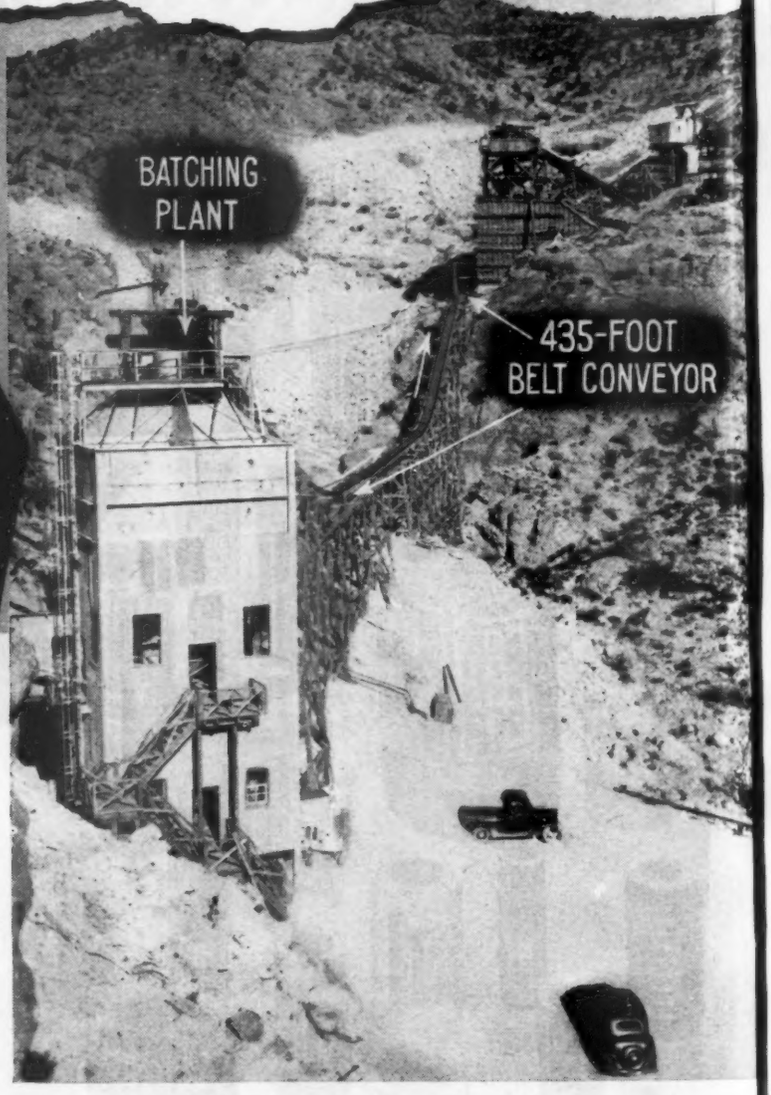
QUALITY RUBBER PRODUCTS FOR INDUSTRY FOR 85 YEARS

HEWITT'S NEW HOSE CATALOG is just off the press. This Catalog has been carefully prepared to provide you with complete details of Hewitt hose so that you can easily select the proper hose to fit your individual needs. *Send for your copy TODAY.*

The Problem — to move sized aggregate to batch mixing plant across 435 ft wide Canyon



S-A Engineering PRODUCED THIS Efficient Answer



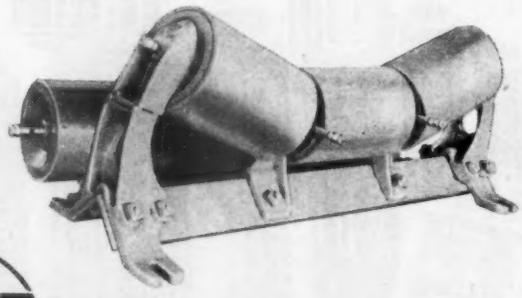
S-A Scalping, Screening, and Washing Equipment prepares sand and gravel for the 435 foot ride across canyon to the batching plant where concrete is produced.

● Out of Stephens-Adamson's 44 year background and S-A engineer's inventive ability, an effective solution can be found for virtually any handling problem, large or small.

In the case shown, involving a complete plant for producing concrete for a great irrigation dam, S-A engineers designed and built the entire plant.

The key to efficiency here lies in the long S-A Belt Conveyor which takes sized aggregate from various bins 435 feet across the canyon to the batch mixing plant. This belt, operating on a high trestle, delivers aggregate through a distributing turnhead into the proper bin compartments of batching plant.

All other operations . . . crushing, screening and washing gravel . . . are accomplished by S-A equipment. Find out how *your* operations can benefit by S-A Engineering.



The canyon-spa ning S-A Belt C veyor is equipp with famous S Simplex-Type C riers like the o shown here.

STEPHENS-ADAMSON MFG. CO.

20 RIDGEWAY AVENUE, AURORA, ILLINOIS — LOS ANGELES, CALIF. ★ BELLEVILLE, ONT.

Designers and Manufacturers of All Types of

BULK MATERIAL HANDLING EQUIPMENT

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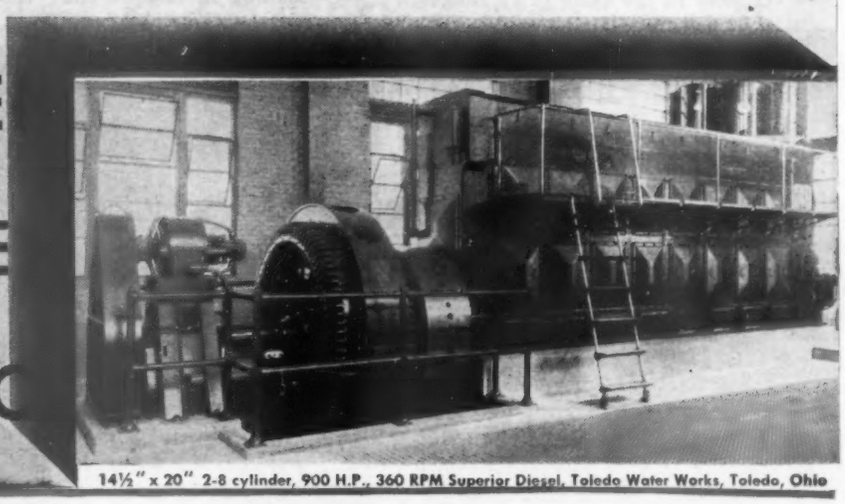
DABLE POWER • DEPENDABLE
LOW MAINTE
POWER • DE
MAINTENANC

Superior
DIESEL



14½" x 20" 2-8 cylinder, 900 H.P., 360 RPM Superior Diesel, Toledo Water Works, Toledo, Ohio

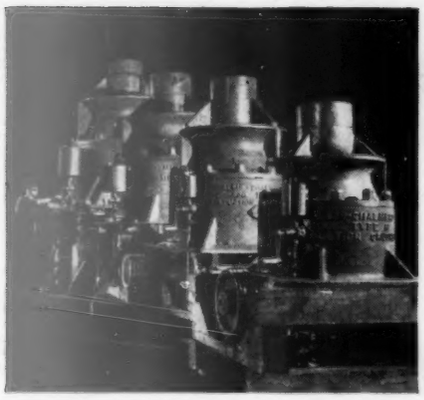
SUPERIOR DIESELS • MARINE • STATIONARY • LOCOMOTIVE

• Superior ENGINES
Division of THE NATIONAL SUPPLY CO.
Plant and General Sales Office: Springfield, Ohio

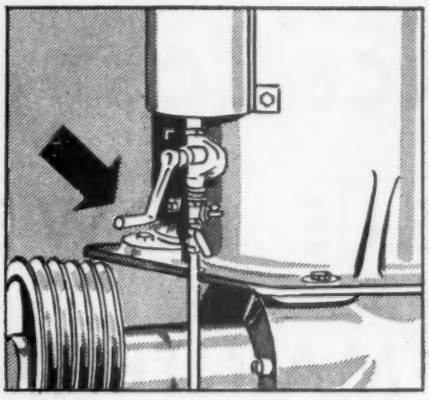
T IN BINDING

A-C'S TYPE "R" SECONDARY CRUSHER

GIVES YOU HIGH CAPACITY, CLOSER CONTROL, A MORE UNIFORM PRODUCT ...AT A LOWER COST PER TON!

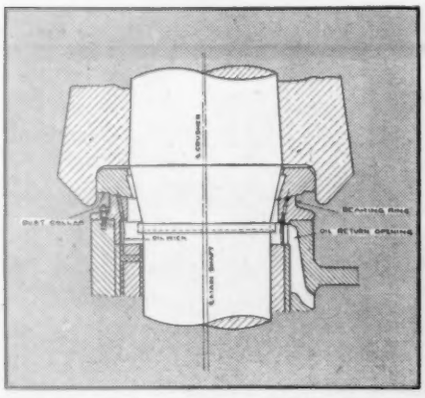


1 Actual comparison *proves* that Type "R" will give you a *more uniform* product, *greater capacity,* at a given setting, of size of product required than any other crusher in the same price range.

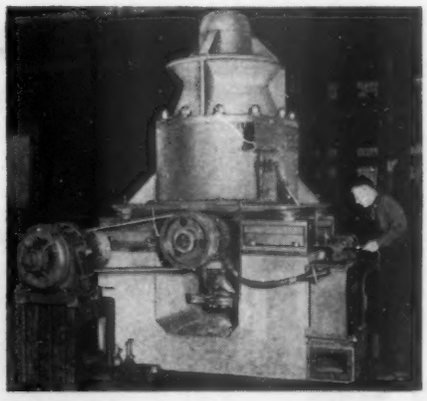


2 Exclusive A-C "Speed-Set" control permits *quick* change of product size at simple, almost effortless *turn of a crank.* Result: close product control, fast unloading in case of emergency.

3 Crushing surface is a 1-piece ring, held in place by a unique *self-locking* device. Entire crushing chamber is designed to assure continuous high capacity, a more uniform product.

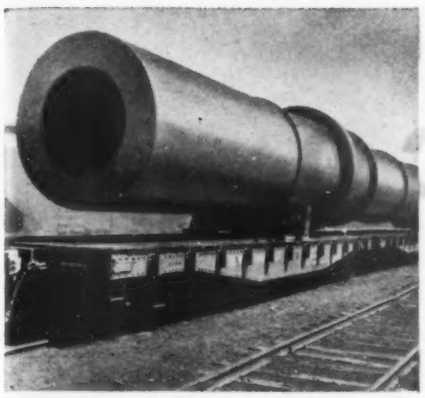


4 Internal parts of Type "R" crusher are *protected* against dust, dirt, etc. by this gravity-type dust seal. Elsewhere, an automatic relief valve *guards against damage* by tramp iron, bolts, etc.

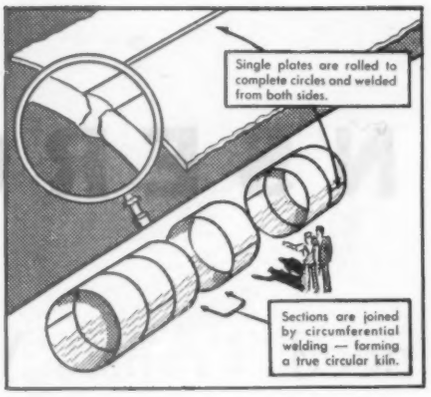


5 All Type "R" crushers are *assembled and shop-tested* before shipment. Checked for trouble-free operation, are: crusher movement; head clearances; oil circulation, temperatures, etc.

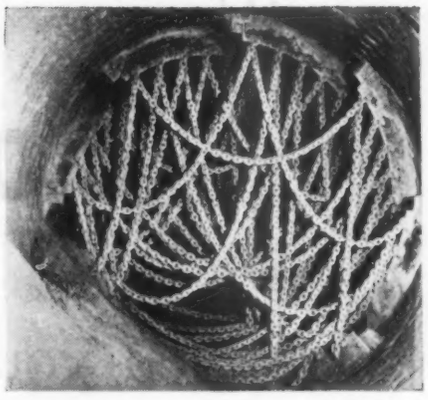
6 Now add ease of installation and operation, lower maintenance, fact that you can buy modern Type "R" crushers for *same or less* money than most comparable crushers! Send for B6006B.



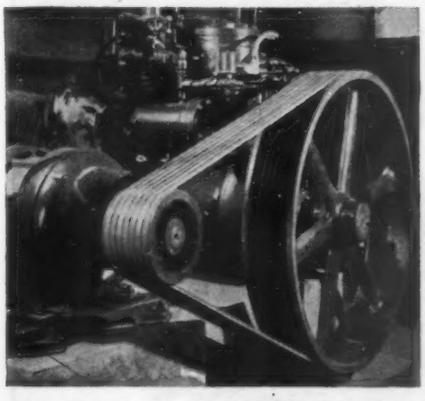
7 Almost 2/3 of U.S. cement production is handled by A-C rotary kilns. Other products being treated in *large quantities* and at *lower cost* are: lime, ores, oxides, varied synthetic materials, etc.


Single plates are rolled to complete circles and welded from both sides.
Sections are joined by circumferential welding — forming a true circular kiln.

8 A-C kiln shells are rolled *one plate to the circle,* as contrasted with competitive 3-to-circle design. Result: A more truly *circular* shell—*easier* lining installation, *longer* lining life!

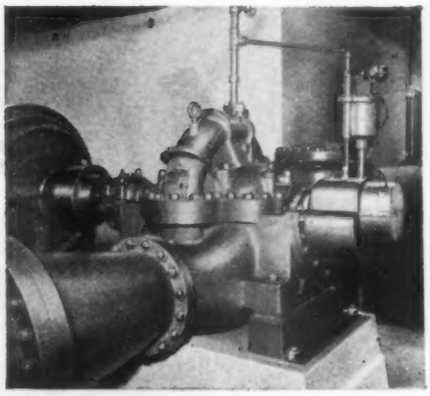


9 End view of kiln with A-C chain system which *accelerates* slurry drying, *increases* kiln capacity, *lowers* fuel consumption as much as 20%, and *saves* on costly auxiliaries otherwise needed.



10 A-C not only builds basic processing machinery, but motors, controls, Texrope drives needed to run it. That means unit-responsibility—no "buck-passing"!

11 Planning ahead for more efficient power distribution in your plant? This scale model "Unit Substation Builder Set" can help you plan *visually*—saves time!



12 This 2-stage Mine Dewatering Pump, rated 9000 gpm, 360 ft head is typical of A-C pumps for coal. Others in capacities from 10 to 150,000 gpm, heads to 2500 lbs.

A-C COOPERATIVE ENGINEERING COVERS YOUR COMPLETE OPERATION!

. . . not just basic *processing* machinery, but power and distribution, motors and drives, control, pumps — almost *everything* needed to *run* that equipment! Thus, A-C Cooperative Engineering "teams-up" machines *and* power to give you greater production . . . not only with new, but *existing* equipment as well. And because A-C builds many *different* kinds of equipment — *over 1600 in all* — our engineers don't have to "push" one type. Result: their recommendations to you are based on the *exact* job to be done, and not on an *improvised* way of doing it!

A 1891

ALLIS-CHALMERS

MILWAUKEE 1, WIS.

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When you need Transit Mix Trucks
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4, 4½ or 5 yd. Mixers mounted on
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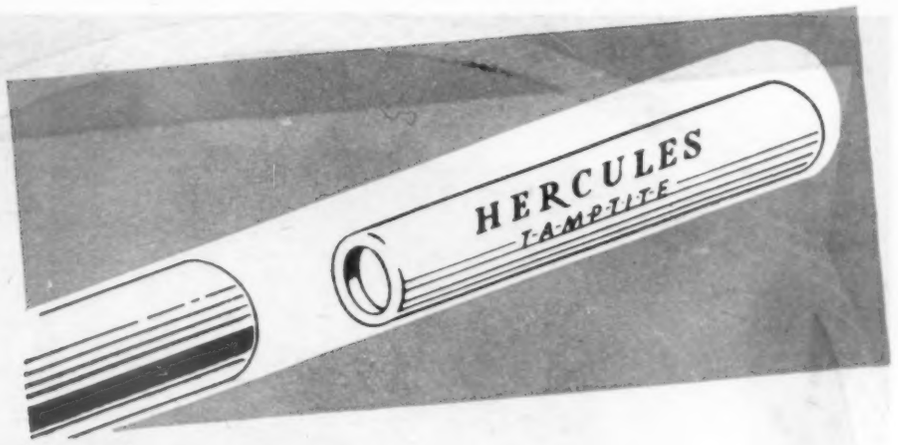
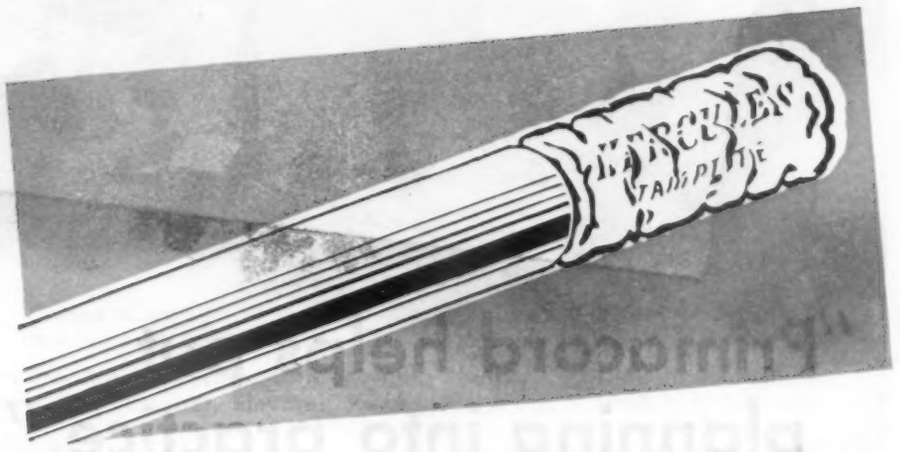


TAMPTITE

SAVES MAN-HOURS



You save time, labor, and expense with Hercules explosives in Tamptite cartridges—important savings in a period of manpower shortages.

You drill and tamp in the usual way, using your favorite Hercules explosive. But when you tamp a Tamptite cartridge, the dynamite expands to fill the bore hole snugly, leaving virtually no air space. (No need to slit cartridges and risk spilling powder.) The charge is concentrated where it is most effective.

Result: Better breakage of the ore or rock, speedier mucking, a faster mining cycle. Man-hours saved!

Hercules Gelamites, Hercomites*, Extra Gelatins, Gelatins, and Extra Dynamites —in small sizes for mining, quarrying, and construction—are furnished in Tamptite cartridges. This is another reason for specifying Hercules.*

HERCULES

EXPLOSIVES DEPARTMENT, HERCULES POWDER COMPANY INCORPORATED 960 KING STREET, WILMINGTON 99, DELAWARE

XR-53

*REG. U. S. PAT. OFF. BY HERCULES POWDER COMPANY

"Primacord helps put planning into practice."

So many factors enter into planning a shot — things like your drilling equipment, labor supply, shovels, transportation system — even the weather. Naturally you don't want to add *more* limitations when it comes to actually doing the job. Primacord can be a big help to you.

PRIMACORD makes it easy to use as many holes in a shot as you need to carry out your plan. The sky's the limit.

PRIMACORD allows exact loading to meet every variety of rock strata, yet gives positive detonation to every cartridge in each deck load.

PRIMACORD produces a detonating wave that moves at a speed of nearly four miles per second. Rows of holes can be hooked up in sequence so that those nearest the face will shoot first, relieving the burden a split second ahead of back rows.

PRIMACORD assures complete detonation of every properly placed cartridge, which means better fragmentation and more uniform digging according to plan. P-9

It's four bases for a homer when Primacord goes to bat.

Also
ENSIGN-BICKFORD
SAFETY FUSE
Since 1836

THE ENSIGN-BICKFORD COMPANY • Simsbury, Connecticut

PRIMACORD-BICKFORD Detonating • Fuse •

Yours for the asking.

Copies of any or all of these interesting and informative bulletins. Ask for each by its number.

1999 Two-Unit and Three-Unit Crushing Plants . . . . . 1960 Jaw Crushers
1991 C. E. P (Crusher, Elevator, Power) Plants . . . . . 1993 Roll Crushers

• The Post-War demand for crushed aggregate for highway and all other forms of construction will be tremendous. Austin-Western is ready for present and Post-War demands with job-tested equipment, including:

Jaw Crushers and Roll Crushers in a wide range of sizes; plus matching screens, elevators, conveyors and bins.

Portable Crushing Plants, from the smallest to the magnificent Two-Unit and Three-Unit Plants which combine maximum output and variety of specification on the one hand, and maximum economy of operation on the other; giving the owner flexibility of operation that spells maximum profits.

Your nearby Austin-Western dealer will be glad to recommend the plant best suited to your needs.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.

BUILDERS OF ROAD MACHINERY
Austin-Western
SINCE 1859

BUY MORE WAR BONDS

LIKE A TOP-FLIGHT GOLFER

FORM-SET ROPE IS *Relaxed*

When the champion rifles his drive down the fairway, the gallery murmurs admiringly, "Doesn't he make it look easy!" And, for him, it *is* easy. Timing perfect, swing perfect. The secret is *relaxation.*

Much of that same relaxed effect is present in Form-Set rope. Form-Set is Bethlehem's preformed rope, and it spools easily, handles easily—every last foot of it. The reason, of course, is that a preformed wire rope has been relieved of many internal stresses; it's limber, bendable, supple. It doesn't require extensive breaking-in.

Well, you ask, what do I get besides this easy handling? Anything else?

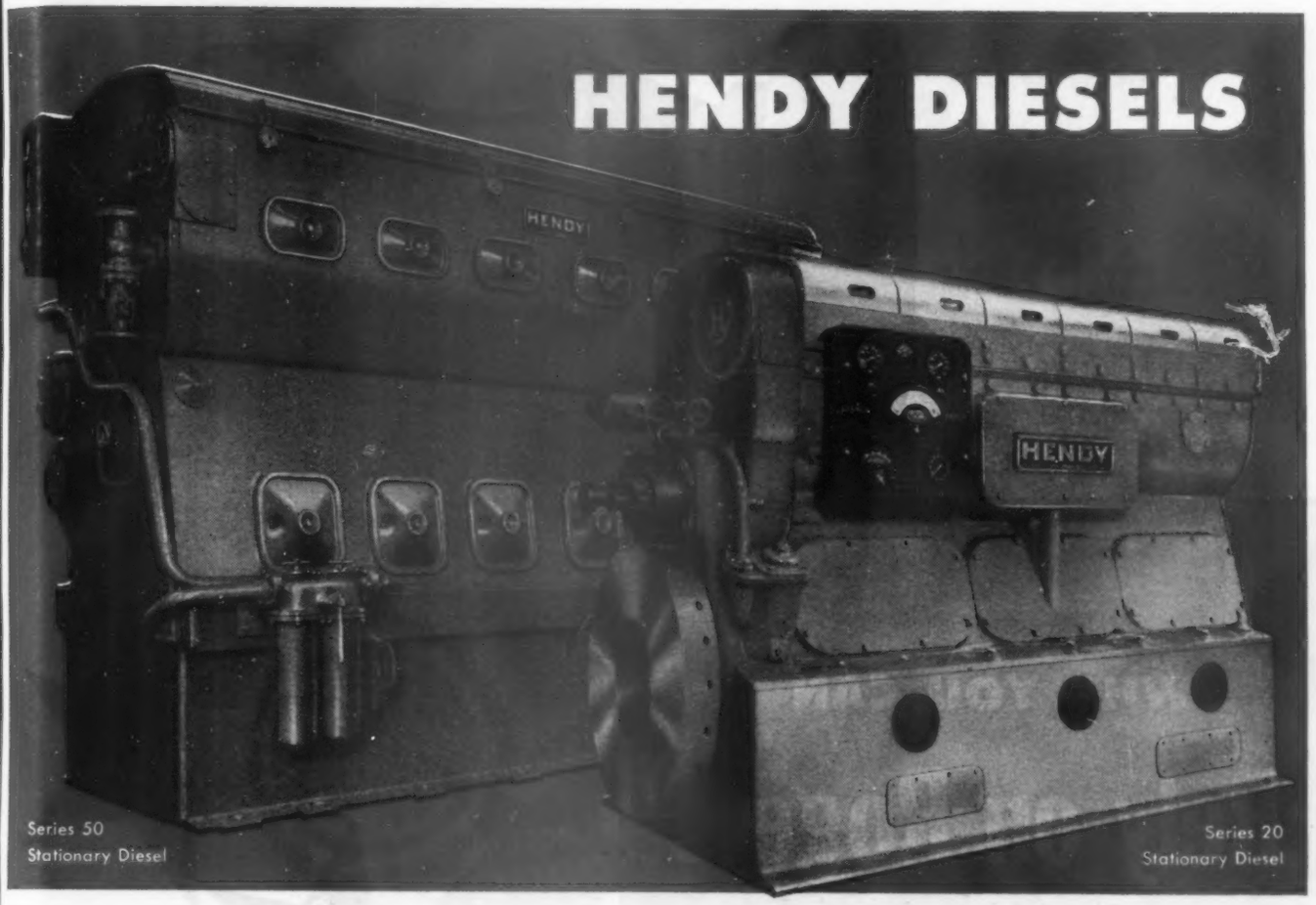
Plenty—when it's a Form-Set rope. With stresses, strains, and tension reduced, a rope has high resistance to bending fatigue—and that means longer life, fewer replacements.

Sounds pretty logical, doesn't it? See for yourself with a reel of *relaxed* Form-Set*.

**All grades of Bethlehem wire rope are available in the Form-Set construction.*

BETHLEHEM STEEL

When you think WIRE ROPE . . . think BETHLEHEM



now available from 125 to 780 horsepower

Industrial operators are finding that in Hendy Diesels there is *more* than meets the eye. Besides their clean-cut appearance, they embody many features never before available in any one engine.

DEPENDABILITY: Unit-type fuel pumps and injectors eliminate high-pressure fuel lines and danger of air-locks. Overhead camshafts eliminate many moving parts and give quiet, reliable valve and fuel-pump action. Full pressure lubrication to moving parts assures the correct amount of oil at the right places, automatically.

ACCESSIBILITY: Fuel-transfer, lubricating-oil and cooling-water pumps, oil coolers, fuel and lube-oil filters are *conveniently* located and instantly accessible. Large inspection-doors, which can be removed without disturbing any other assemblies, give easy access to crankshaft and connecting-rod bearings.

LONGER LIFE: The conservative ratings and heavy-duty characteristics of these engines assure long life and smooth operation. The crankshaft, which is large and well proportioned, is supported by large, replaceable, bronze-backed bearings, all of which receive positive pressure lubrication.

JOSHUA **HENDY** IRON WORKS
ESTABLISHED 1856
SUNNYVALE, CALIFORNIA

GENERAL SPECIFICATIONS

SERIES 20

125 to 260 hp; 600 - 900 rpm; Air starting.

SERIES 50

350 to 780 hp; 350 - 500 rpm; Air starting; Dual intake and exhaust valves.

OPTIONAL EQUIPMENT

includes: Clutch power take-offs from either end; Engine-driven starting-air compressor; Closed-circuit cooling system.

Also available as complete generating plants.

Send coupon today for complete information and name of nearest Hendy representative. No obligation. Joshua Hendy Iron Works, Sunnyvale, California.

JOSHUA **HENDY** IRON WORKS
SUNNYVALE, CALIFORNIA

Please send illustrated catalog on Hendy Diesel engines. I am interested in engines up to 300 hp ☐; over 300 hp ☐; Diesel electric generating plants up to 225 kw ☐; over 225 kw ☐.

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City_____ Zone_____ State_____

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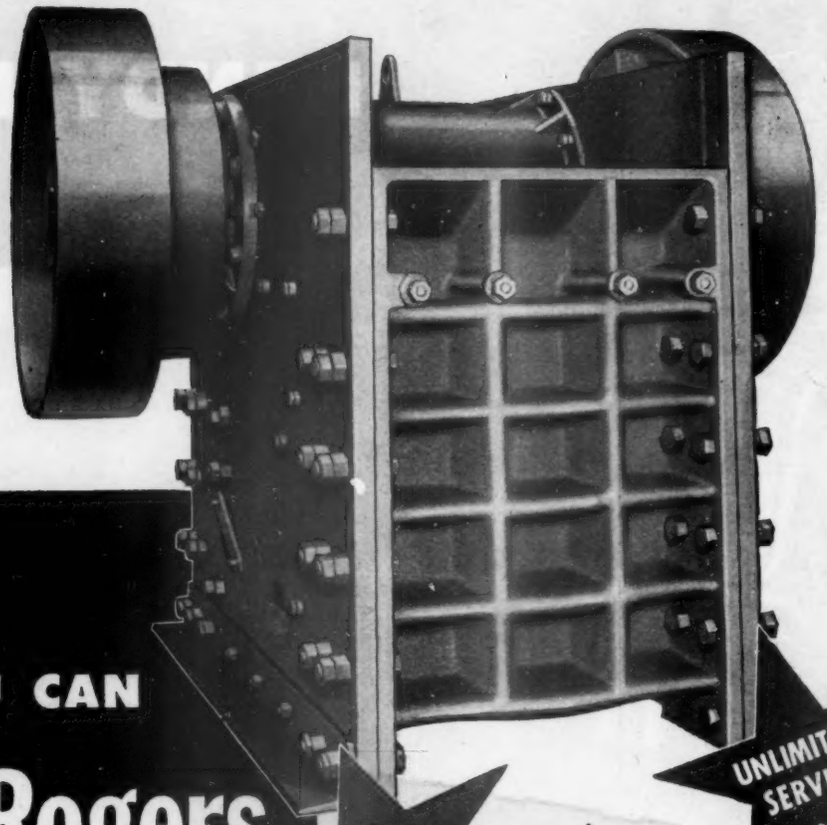


WHY YOU CAN

Rely on Rogers

JAW CRUSHERS

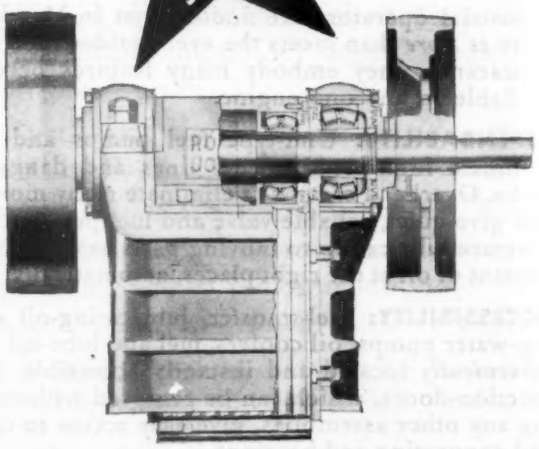
MORE CAPACITY

GREATER STRENGTH

UNLIMITED SERVICE

Oversize bearing and shaft diameters—from two to three sizes larger than normally used—are a big reason why *there has never been a bearing or shaft failure in a Rogers Jaw Crusher* and why Rogers Crushers have a greater rock reduction capacity. The Rogers line of Jaw Crushers is complete, in 16 sizes from a small reduction to a large primary crusher with large jaw opening.

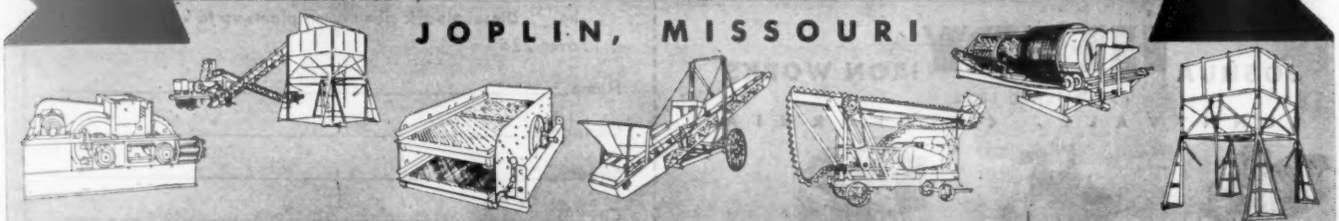
Rogers Rock Reduction machinery for crushing, sizing, conveying and storing has a reputation for reliability, strength and precision performance that has made Rogers a name for economical and efficient operation all over the world. For a single unit or a complete plant, you can always "Rely on Rogers".



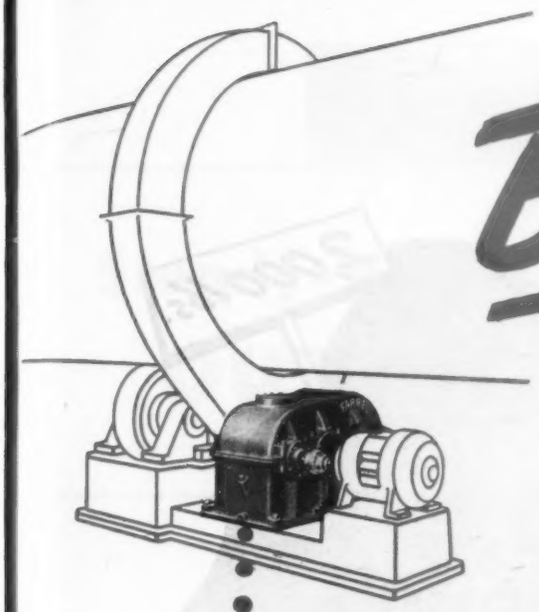
The heart of the Rogers Jaw Crusher—oversize shaft and anti-friction bearings. (Also available with bronze bearings.) Write for complete descriptive bulletin today.

ROGERS IRON WORKS CO.

JOPLIN, MISSOURI



Quarry Plants • Gravel Plants • Jaw Crushers • Roll Crushers • Belt Conveyors • Bucket Elevators • Screens • Feeders • Steel Bins



Backbone makes this SPEED REDUCER stand out in jobs like these

The gears in Farrel Speed Reducers are the *Gear with a Backbone* type, precision generated by the famous Farrel-Sykes process. The *backbone*—the place where the helices meet to form continuous herringbone teeth, instead of being separated by the center groove necessary in some gears for tool clearance—provides extra strength and capacity to withstand the shocks, stresses and wear encountered in applications like these.

In addition to making use of the entire face width to carry the power load, the combined characteristics of overlap or interlacing of the teeth, gradual engagement and inclined line of pressure distribute the load on the teeth uniformly and contribute to smooth, quiet operation and maintenance of correct tooth action throughout a long gear life.

Shafts ground to close tolerances and rigidly mounted in roller bearings; a lubricating system providing ample oil supply to gears and bearings; and a heavy section housing which maintains accurate alignment of rotating elements are additional factors contributing to smooth, efficient power transmission with minimum maintenance.

Farrel Speed Reducers are available in a complete range of sizes for any application. Ratios of single reduction units range from 1¼:1 to 10:1, double reduction units up to 60:1, and triple reduction units up to 180:1. Write for descriptive catalog No. 438.

FB-241

FARREL-BIRMINGHAM COMPANY, INC.
344 VULCAN ST., BUFFALO, N. Y.

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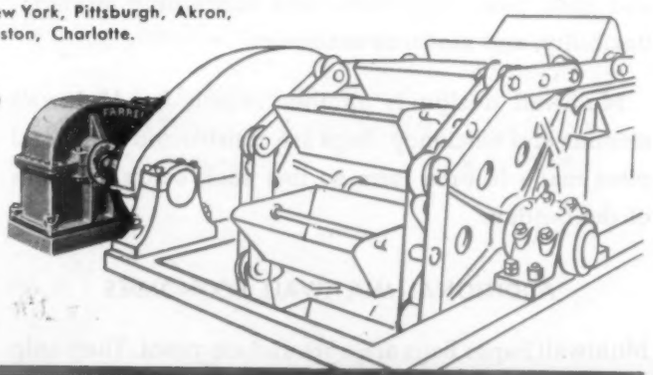
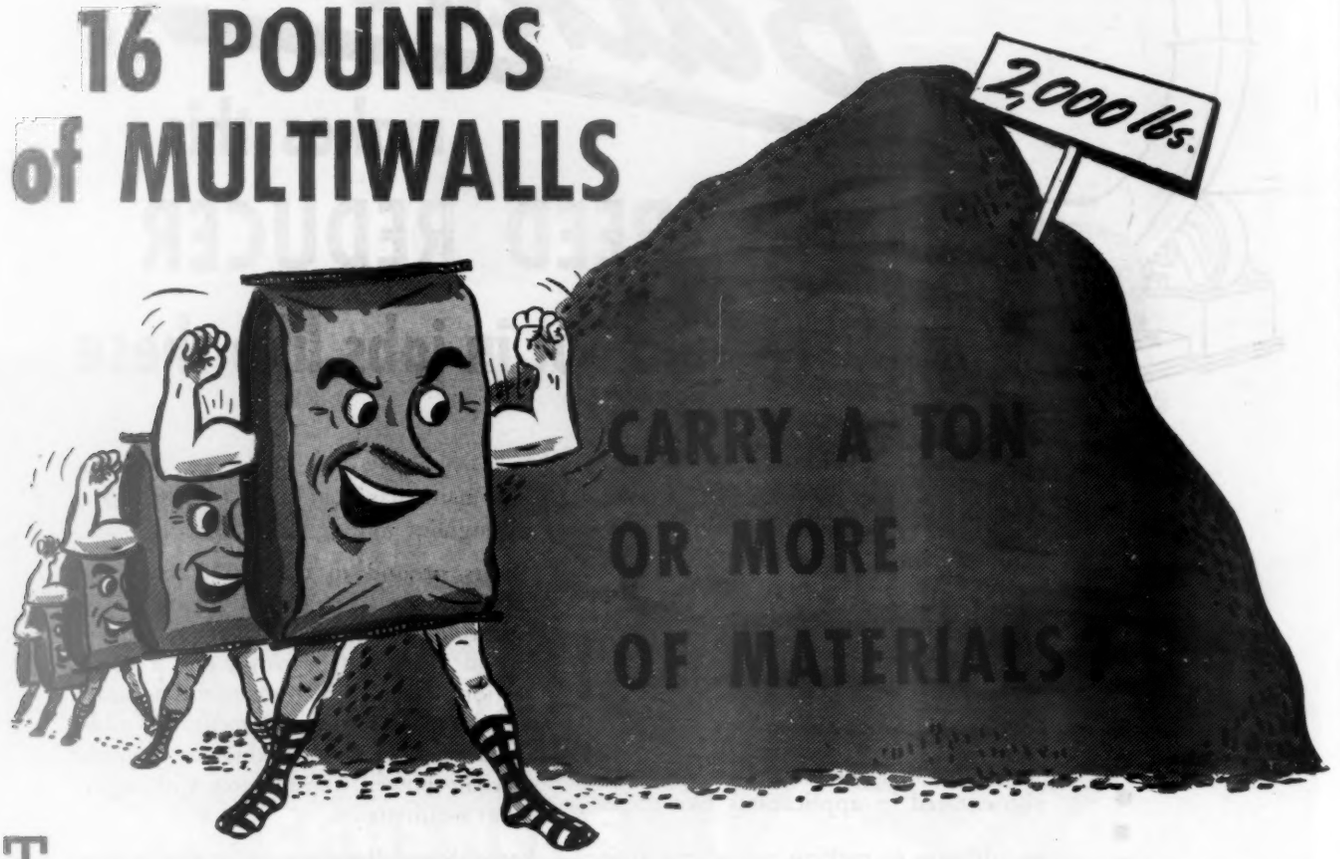
Sales Offices: Ansonia, Buffalo, New York, Pittsburgh, Akron, Los Angeles, Tulsa, Houston, Charlotte.



FARREL
The Gear with a Backbone

Farrel-Birmingham

How can 16 POUNDS of MULTIWALLS



The average 100-lb.-capacity Multiwall Paper Bag is only 8/10 of a pound in weight. Only 16 lbs. of Multiwall bags, therefore, are required to *carry and protect a full ton of material.*

These figures hold an important story of Multiwall packaging efficiency and economy. They also indicate the strength and toughness of the paper of these bags. This paper is made according to exacting specifications and must pass exhaustive tests concerning strength, flexibility, and moisture resistance.

Multiwall design is another reason for Multiwall stamina and efficiency. Bags are constructed of several plies made in tube form so that each bears its share of the burden.

ADDITIONAL MULTIWALL ECONOMIES

Multiwall Paper Bags are tight and sift-proof. They help keep storerooms tidy. And, because materials do not readily cling to their smooth interior walls, they empty quickly and cleanly . . . cut retention losses to a minimum.

St. Regis bag filling machines and methods offer still another worthwhile economy. Results have shown that these machines definitely speed filling operations, reduce labor and equipment costs, and release manpower for other jobs.

To find out how Multiwall Bags and bag-filling systems can be advantageously applied to your business, write or call your nearest St. Regis office TODAY.

MULTIPLY PROTECTION • MULTIPLY SALEABILITY

ST. REGIS PAPER COMPANY

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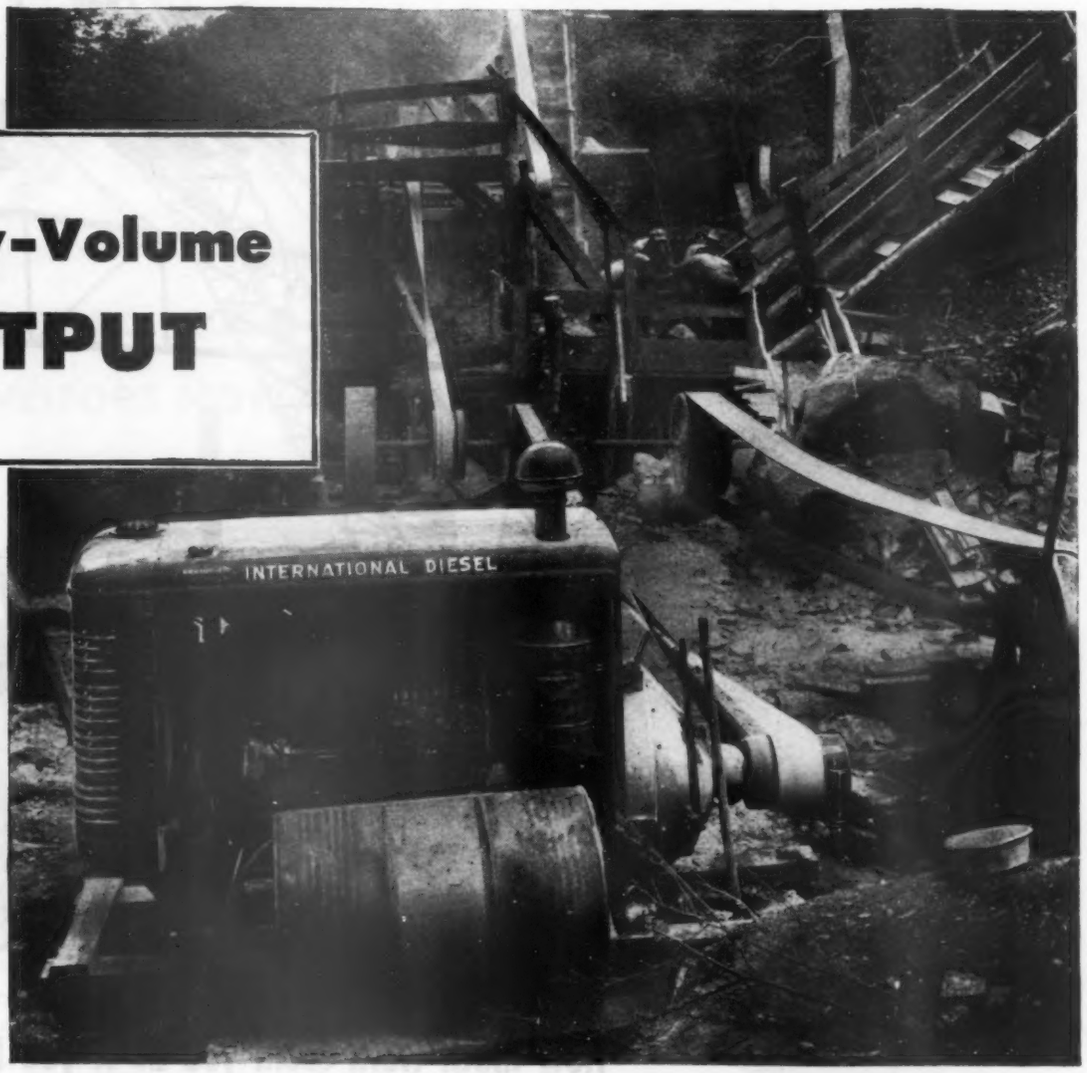
New Orleans, La. Franklin, Va. Seattle, Wash. Nazareth, Pa. Toledo, Ohio

Steady-Volume OUTPUT



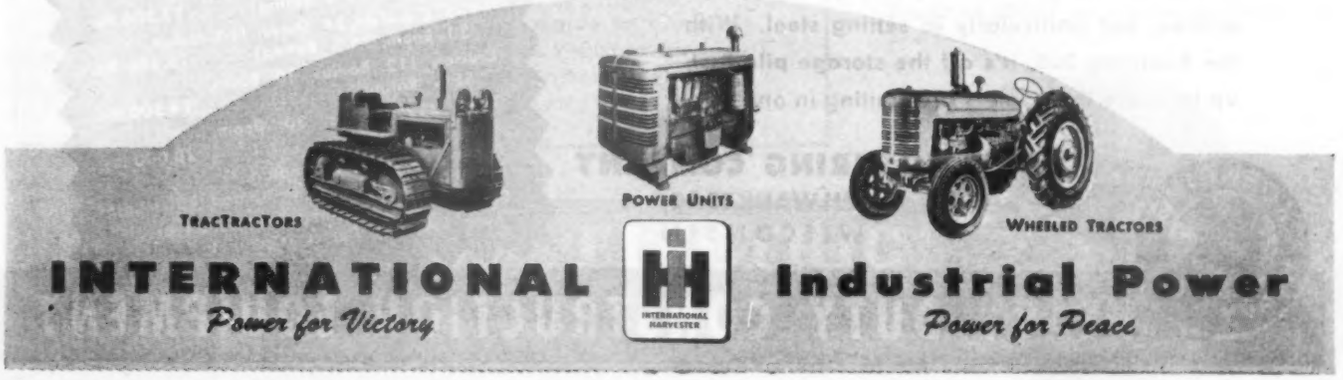
. . . and the Power is INTERNATIONAL

CRUSHING PLANTS powered by International Diesels are satisfactorily equipped for steady-volume output at low cost.

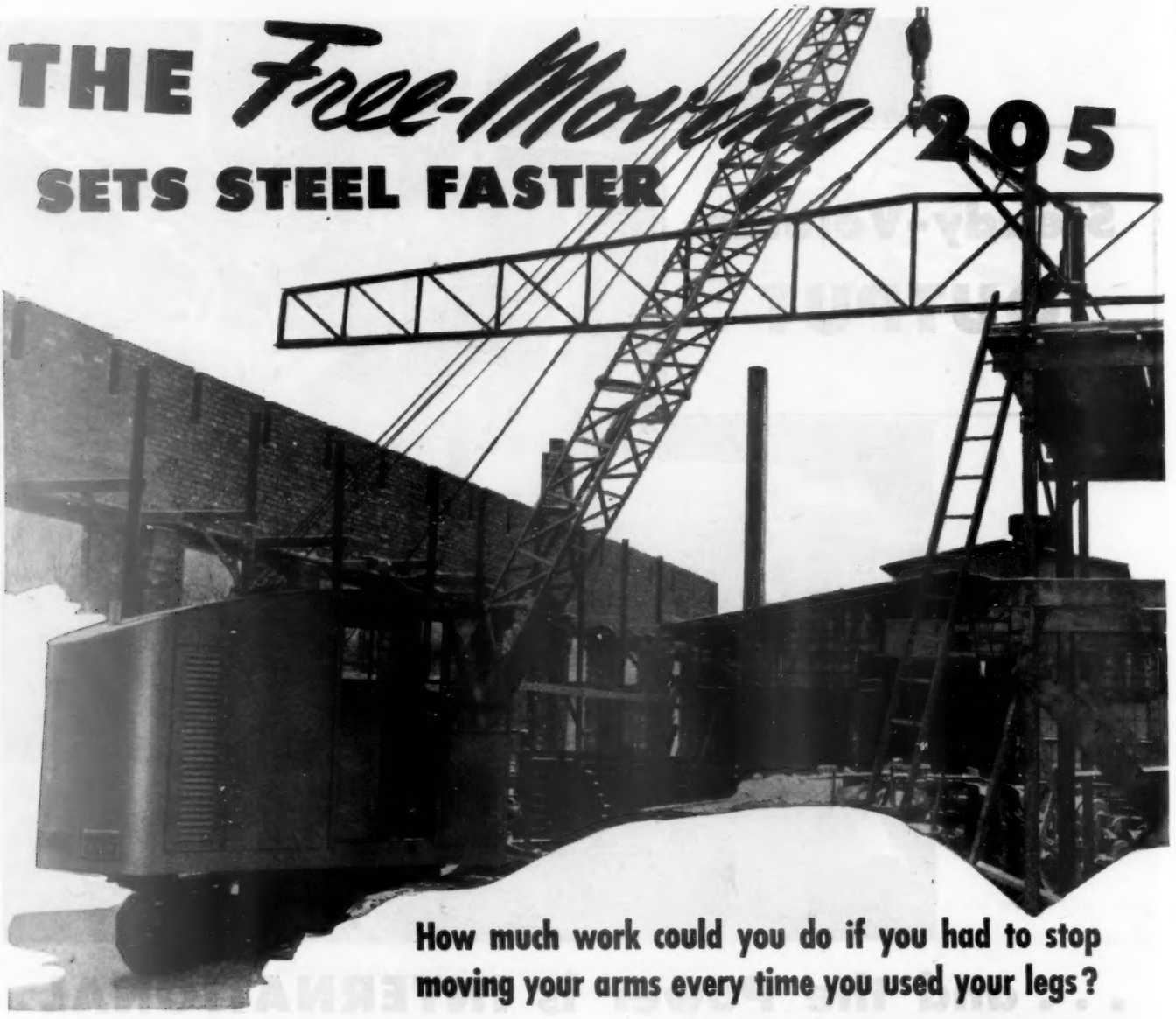
The International UD-18, 100 h.p. Power Unit at work on this job is typical. *Full* Diesel engine—low consumption of low-cost fuel—International's quick, easy starting feature—bulldog hang-on when the load gets heavy—low maintenance. Take these together and they account, in part, for the preference shown Internationals and the excellent reputation they enjoy everywhere.

The nearest International Power Distributor can give you all the facts on International Power Units—Diesel or carburetor types.

Industrial Power Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois



THE *Free-Moving* 205 SETS STEEL FASTER



How much work could you do if you had to stop moving your arms every time you used your legs?

On the Koehring 205, traction is free, independent of all other operations. A separate, individual lever controls forward and reverse travel.

You can swing while you move, raise or lower the boom while you move, hoist while you move. You can travel, swing, hoist, raise or lower the boom—all at the same time. No need to stop any other operation in order to move.

Twenty-five per cent greater maneuverability means greater production per day on any operation, but particularly in setting steel. With the Koehring 205, it's off the storage pile fast, up to where the riveters are waiting in one continuous, unbroken move. Then inched into place more swiftly, because *ALL* operations—travel, swing, hoist and boom hoist are available in any desired combination or simultaneously.

205 Crane Facts

Available as Crawler Crane, Truck Crane or One-Man Operated Rubber-Mounted Cruiser Crane.

Lifting Capacities:

10' Crawlers, 16" Shoes: (10' radius, 30' Boom, 75% Rating) . . . . . 13,800 lbs.

11'-5" Crawlers, 24" Shoes: (10' radius, 30' Boom, 75% Rating) . . . . . 15,500 lbs.

Cruiser: (12' Radius, 30' Boom, 85% Rating) . . . . . 14,500 lbs.

Truck: (12' Radius, 30' Boom, 85% Rating) . . . . . 20,000 lbs.

Booms: 30' length standard. Additional segments in 5' and 10' lengths.

Clutches: Smooth acting inside band type.

Power Lowering Device: Optional.

KOEHRING HEAVY DUTY

ARMY E NAVY

KOEHRING COMPANY
MILWAUKEE 10, WISCONSIN

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Now UP TO 2000 hp!

STANDARD 2000-HP TRI CLAD MOTORS NOW AVAILABLE

THEY GIVE EXTRA PROTECTION 3 ways

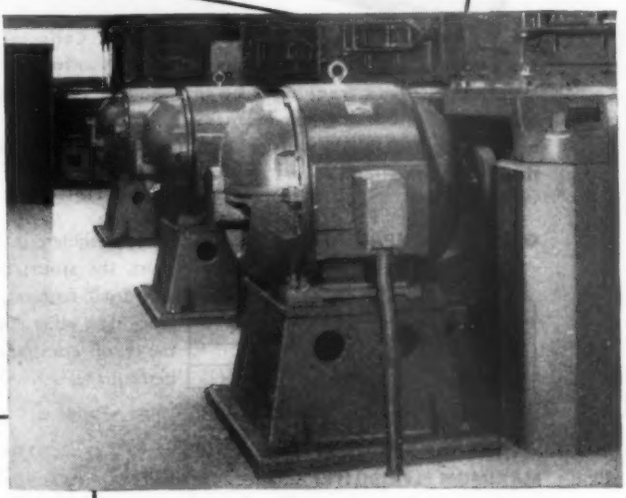
1 **Extra protection from physical damage**—Cast-iron construction. Upper portion completely enclosed. Streamline, cast-iron end shields. Corrosion-resisting finish.

2 **Extra protection from electrical breakdown**—Windings of Formex* wire, strongly bonded with oil- and moisture-resistant synthetic resins, stand up under abrasion or "heat-shock."

3 **Extra protection from operating wear and tear**—Sleeve or ball bearings, in dust-tight housings. Sleeve-bearing design is a further refinement of well-proved Tri-Clad bearing proportions, with cast-in "air seal" to further insure oil tightness of the housing.

The triple-protected construction that has made General Electric's Tri-Clad motor so popular in the small and intermediate sizes has now been extended to motors of 2000-hp capacity. On your *big* drives, these new Tri-Clad motors will meet severe conditions with greater assurance than ever of dependable service and long life.

The Tri-Clad motor, in its wide range of types and sizes, is industry's most popular integral-hp motor. Chances are there's a standard Tri-Clad to meet your requirements "on the nose." For information on G.E.'s complete line of Tri-Clad motors, ask for Bulletin GEA-3580. *General Electric Company, Schenectady 5, N. Y.*



Three of the new, large Tri-Clad motors, each rated 200 hp, 1200 rpm, driving coal pulverizers in a Southern steam-electric plant

*Trade-mark reg. U.S. Pat. Off.

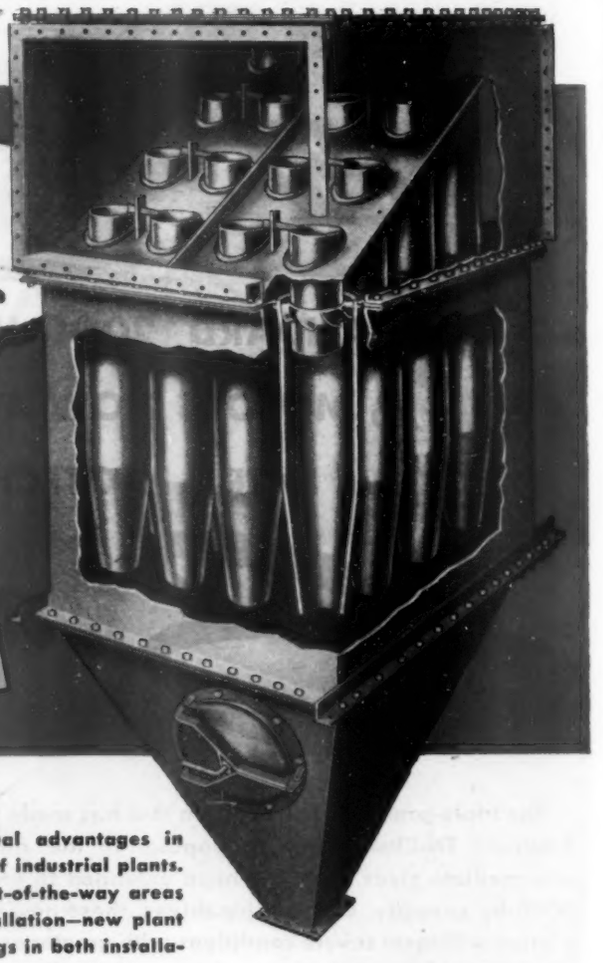
HERE'S TODAY'S WIDER RANGE OF STANDARD SIZES	
TRI CLAD Type K	—1 hp to 2000 hp at 1800 rpm
TRI CLAD Type KG (High starting torque, low starting current)	—5 hp to 200 hp at 1800 rpm
TRI CLAD Type KR (High starting torque, high slip)	—Available to 100 hp in speeds required for high-slip, flywheel drive (punch press, etc.)

Buy all the BONDS you can—*and keep all you buy*

GENERAL ELECTRIC

Having trouble finding space for • DUST RECOVERY EQUIPMENT?

THESE 4 MULTICLONE SPACE-SAVING ADVANTAGES MAY BE THE ANSWER!

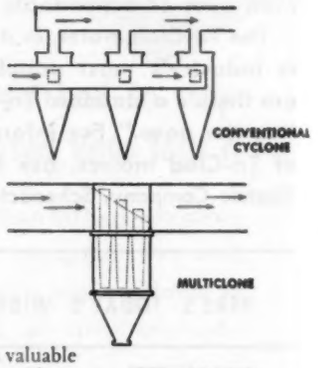


MULTICLONE Collectors offer unusual advantages in compactness and adaptability to the space limitations of all types of industrial plants. MULTICLONES can frequently be installed in even waste spaces—out-of-the-way areas too small for other types of recovery equipment. And in any installation—new plant or old—MULTICLONE'S unusual compactness permits important savings in both installation and operation . . .

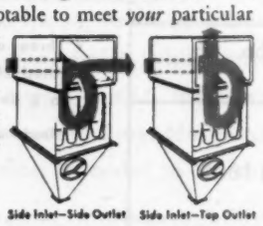
GREATER COMPACTNESS: To begin with, as shown in this chart, the MULTICLONE unit itself requires less space than other equipment of comparable performance . . .

Make	Relative Space Requirements In Sq. Ft.	In Cu. Ft.
Multiclone	1.0	1.0
Collector A	2.1	1.8
Collector B	5.9	3.2
Collector C	6.8	3.9

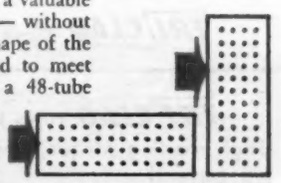
SIMPLE DUCT REQUIREMENTS: In contrast to conventional cyclones which require complicated space-wasting inlet and outlet arrangements, the MULTICLONE requires only simple inlet and outlet ducts that save headroom and permit a far more compact installation.



MAXIMUM FLEXIBILITY: Another advantage—MULTICLONE inlet and outlet hook-ups are readily adaptable to meet *your* particular requirements. Side-inlet side-outlet or side-inlet top-outlet arrangements are easily made, giving wide flexibility to fit cramped spaces. And where necessary, even top-inlet side-outlet construction is available.



FITS CRAMPED SPACES: And here's a valuable MULTICLONE space-saving feature — without affecting capacity or efficiency the shape of the MULTICLONE can generally be varied to meet specific space needs. For example, a 48-tube unit can be supplied either 12 tubes wide and 4 tubes deep to fit a wide shallow space...or 4 tubes wide and 12 tubes deep to fit a long narrow space...or still other tube patterns to meet space requirements.



—the compactness and space-adaptability of the MULTICLONE is only ONE of its many advantages. Its small tube design with patented vane for guiding and distributing the gases means high recovery efficiency of both large and small particles • Its flat sides and simple ducts reduce both installation and insulation costs • It has no high speed moving parts to maintain • These and still other MULTICLONE advantages are outlined in this booklet. Send for a copy today!

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

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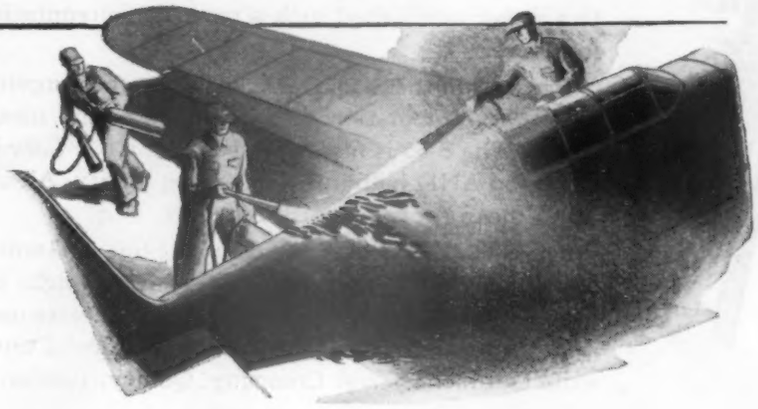
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

They Needed a Special Kind of Hose

Thermoid Solved the Problem



The General Detroit Corporation, manufacturers of fire extinguishers, asked Thermoid to produce 5/16" wire braid hose, duplicating or improving upon the hose they were then using. Thermoid turned the problem over to its engineering and research staff and they came up with the solution. They engineered a special hose. The tube particularly was designed to handle CO_2 under pressure, with the added feature of being made resistant to the permeating effect of CO_2.

Speaking of this problem, E. A. Warren, Vice-President of The General Detroit Corp., says: "It is simply a grand job of cooperation between Thermoid Company and The General Detroit Corporation, another case where cooperation can make a fine record of necessary goods turned out for the Army and Navy." This problem is one of the many which Thermoid engineers are solving to improve the quality of the products of American industry. If you have a problem concerning the use, design or manufacture of industrial rubber, why not call in the Thermoid field representative.

DON'T PUT IT OFF 'TIL TOMORROW
Buy More War Bonds Today!

"IT'S GOOD BUSINESS TO DO BUSINESS WITH THERMOID"

Thermoid Rubber

DIVISION OF THERMOID COMPANY

TRENTON, NEW JERSEY

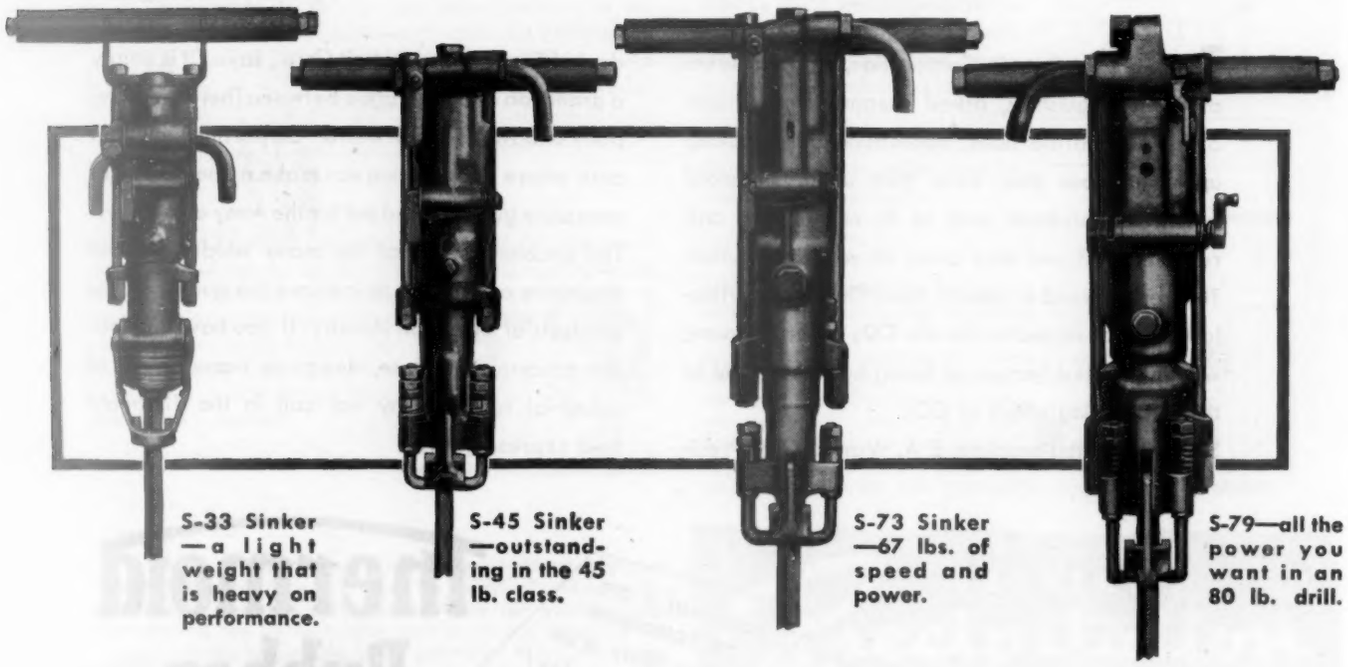
THE THERMOID LINE INCLUDES: Transmission Belting • F.H.P. and Multiple V-Belts and Drives • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Sheet Packings • Industrial Brake Linings and Friction Products • Molded Hard Rubber and Plastic Products.

WHY DO THEY SAY *This Drill Has No Equal?*

Why do so many users say that the Gardner-Denver S-55 Sinker has no equal in its weight class? Why has this sinker established such a remarkable reputation for performance?

Because, in the S-55, Gardner-Denver has provided exactly the *right* combination of qualities to assure maximum efficiency. The S-55 is fast AND easy riding . . . low in air consumption AND high in hole-cleaning ability. All of this adds up to *more footage*—with economy.

The S-55 is typical of the complete line of Gardner-Denver hand-held drills. Each is a winner in its weight class—each has the engineering "extras" that mean greater user satisfaction. For complete information about Gardner-Denver sinkers, write Gardner-Denver Company, Quincy, Illinois.



S-33 Sinker —a light weight that is heavy on performance.

S-45 Sinker —outstanding in the 45 lb. class.

S-73 Sinker —67 lbs. of speed and power.

S-79—all the power you want in an 80 lb. drill.

GARDNER-DENVER *Since 1859*

MEMO

TO ALL CONSTRUCTION SUPTS...

Better look into High Speed Loading and make every truck count—

W.F.B.

Increased yardage... increased truck trips, with fewer service interruptions—and less cost! That's what a Model 75 Haiss means to you. It's the Loader that "bites" fast into stock piles or banks... the Loader that handles *anything* a man can shovel. Popularly priced, too.

Best of all, count on Haiss for mechanical reliability. Engineered end-to-end ... top-to-bottom—and equipped with an oil-bath-enclosed transmission to make extra sure it can "take it." Investigate Haiss now—while making plans for a more profitable postwar future. Complete information will be sent promptly on request.

GEORGE HAISS MFG. CO., INC.
140th St. and Rider Avenue
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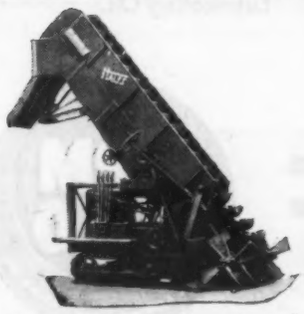
Model 75W Haiss Loader—3 yds. per minute capacity. Also with creeper tread mounting as Model 75C.



Pneumatic-tired Wheels or *Creeper Treads*, depending on your need... and *Interchangeable* in the field if you wish to convert from one to the other as service conditions change.

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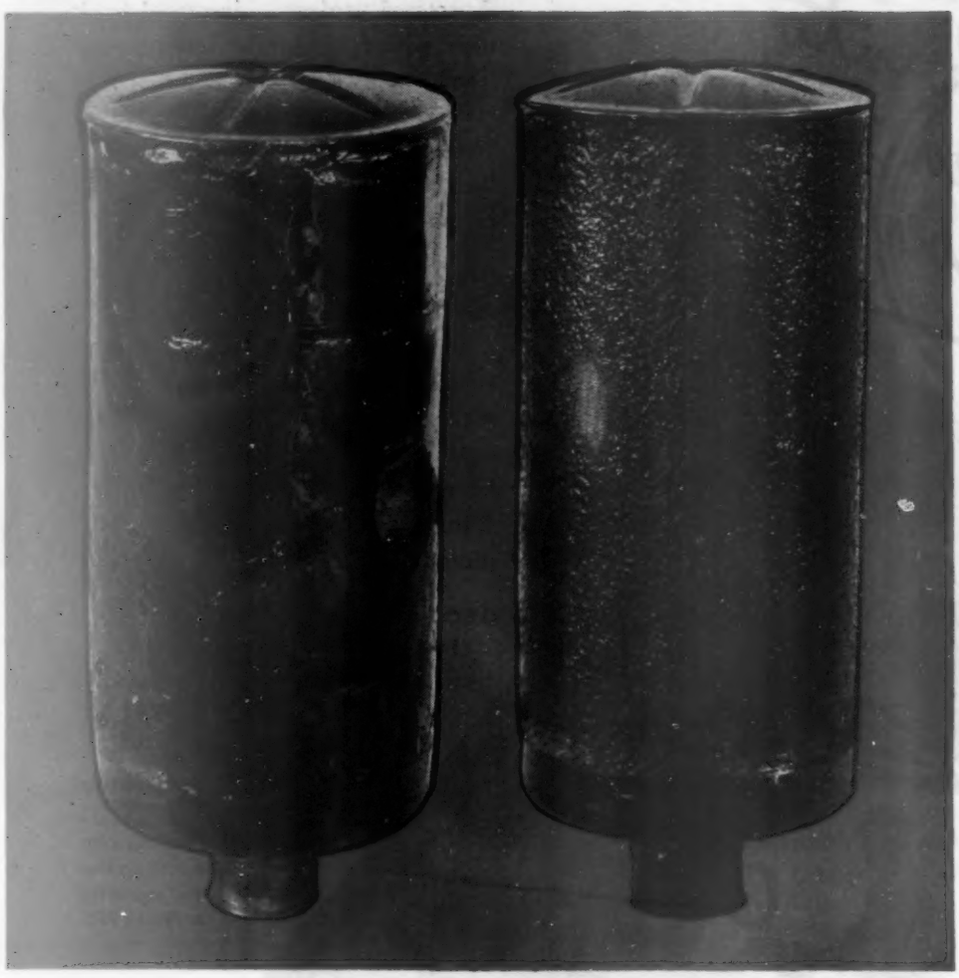
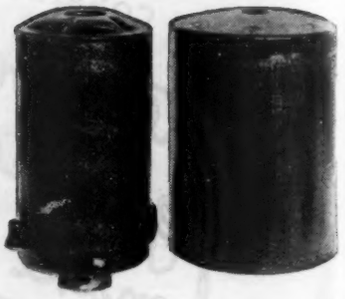
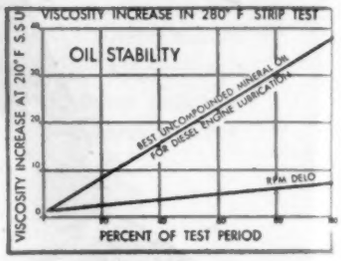
PORTABLE CONVEYORS ★ SNOW LOADERS ★ CLAMSHELL BUCKETS

How RPM DELO OIL stops filter clogging





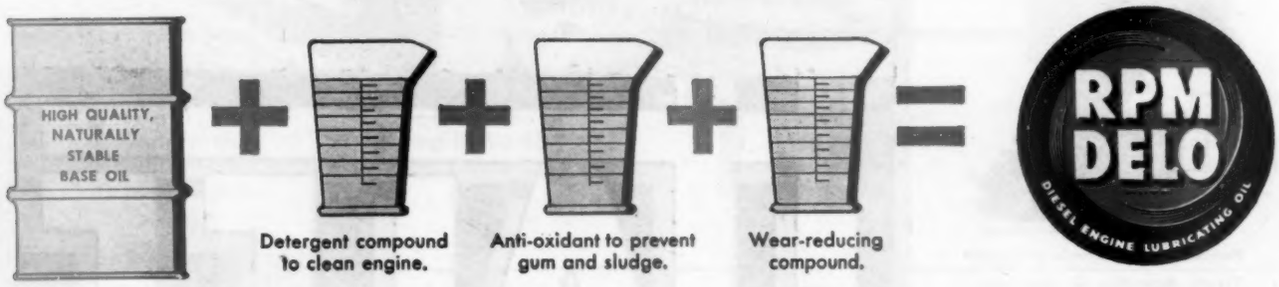
Powerful Anti-Oxidant effects of compounding material in RPM DELO Oil are graphically illustrated by cleanliness of this filter after 500-hour test under heavy duty conditions. Inherent stability of selected base stocks in RPM DELO Oil, plus detergent compounds assure minimum engine deposits, prevention of many costly shutdowns.


VISCOSITY INCREASE IN 280° F STRIP TEST
OIL STABILITY
VISCOSITY INCREASE AT 210° F S.S.U.
BEST UNCOMPOUNDED MINERAL OIL FOR DIESEL ENGINE LUBRICATION
RPM DELO
PERCENT OF TEST PERIOD

This Is How uncompounded oil clogged a regular commercial filter element after only 204 hours in a test run. The shiny sludge deposit is the result of oxidation of oil, plus iron, silica and water. In actual use, a clogged filter can result in stopped-up oil passages and excessive crankcase sludge, necessitating expensive overhauls for cleaning.

Same Type Filter from the same engine, operated on RPM DELO Diesel engine lubricating oil looked like this after 1234 hours. There is little deposit, oil flow is unimpaired. RPM DELO Oil prevents filter clogging two ways: 1. By maintaining piston rings in free working condition. 2. By minimizing oxidation of oil itself.

How RPM DELO Oil resists oxidation far more effectively than other oils is shown in this chart. Results were based upon increase of viscosity during severe laboratory tests. Write Dept. T-X, Standard of California, San Francisco 20, Calif., for more technical information on RPM DELO Diesel Engine Lubricating Oil.


HIGH QUALITY, NATURALLY STABLE BASE OIL
Detergent compound to clean engine.
Anti-oxidant to prevent gum and sludge.
Wear-reducing compound.
RPM DELO
DIESEL ENGINE LUBRICATING OIL

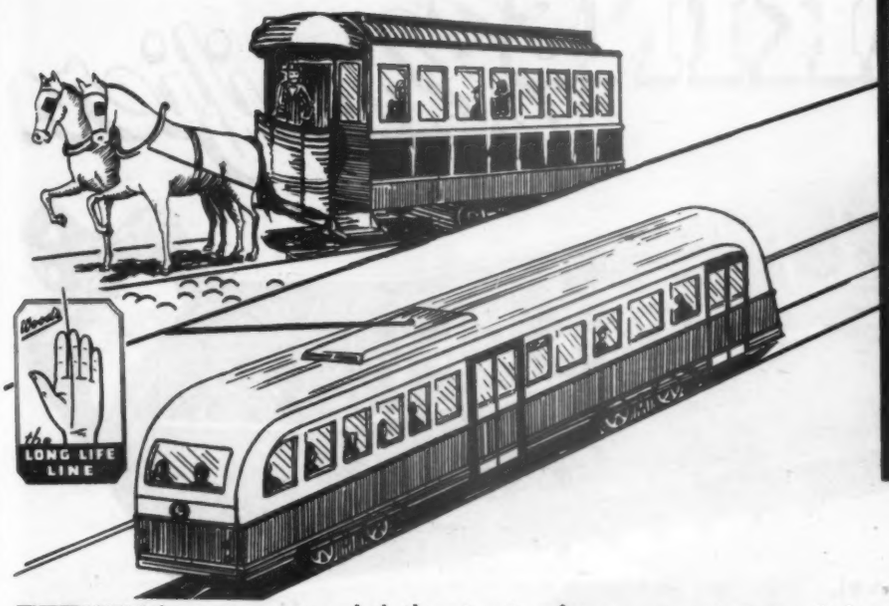
STANDARD OF CALIFORNIA

RPM DELO Oil has world-wide distribution under the names: RPM DELO, Caltex RPM DELO, Signal RPM DELO, Imperial RPM DELO (CONCENTRATE)

Yesterday... and Today - *a well known name...*

Wood's PLANNED POWER TRANSMISSION

The Wood's line of equipment for power transmission comprises bearings, collars, couplings, friction clutches, hangers, pillow blocks, pulleys and shafting for a variety of uses covering various industries, including cement mills, generators; paper mill, wood working and laundry machinery; compressors, mine fans, drill presses and for many other uses.



WHEN horse cars traveled the streets of our cities, Wood's line of power transmission was familiar equipment in shops and factories of those early years. In this modern age of streamlined trolleys and busses, Wood's products provide day-in and day-out *planned* transmission for modern industry

In business since 1857, Wood's today are the oldest builders of cast iron pulleys. The proportions of rim, hubs and arms developed through years of experience in the design and manufacture of pulleys, have helped Wood's to produce the best type of V-groove sheave.

Wood's V-Belts are full molded, resilient and flexible . extremely accurate in design. The fact that horsepower requirements utilize only a small percentage of the ultimate strength of these belts —ruggedly constructed of the strongest materials— accounts for their extremely long life.

Wood's V-Belts and sheaves are *engineered to work together.* Since the proper groove contour of the sheaves permits complete belt contact and uniform seating of the "tailor made" V-Belts, Wood's V-Belt drives transmit energy from its source to the driven machinery with maximum efficiency

Plan for post war now. Engineering consultation always available. Details furnished upon request— or see your conveniently located Wood's distributor.

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Bearings — Collars — Clutches — Couplings — Contactors — Hangers — Pillow Blocks — Pulleys — V-Belt Sheaves and Complete Drives

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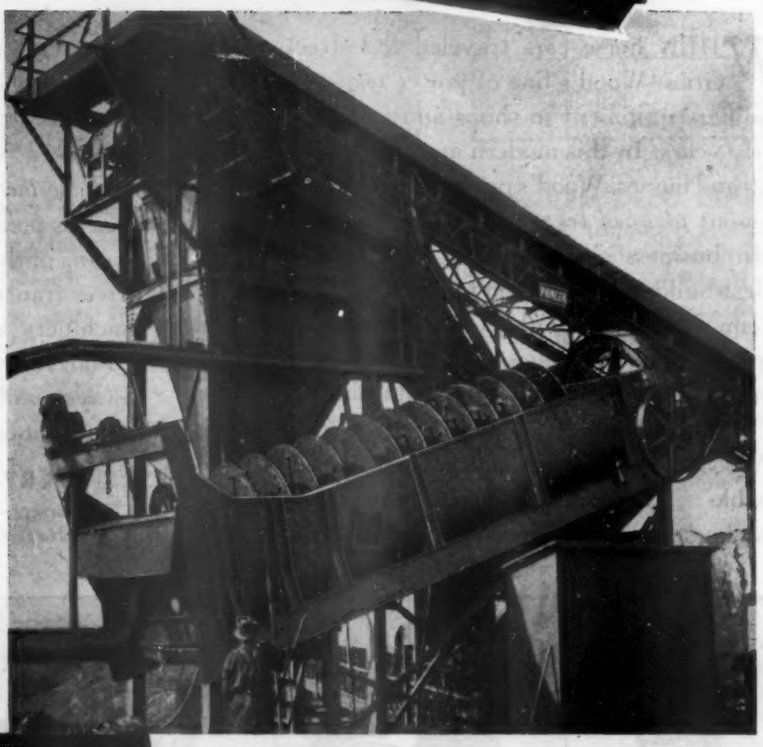
with AKINS *Classifiers*

If you are preparing fine gravel, roofing gravel, concrete sand and "high-specification" sands, it will pay you to investigate the AKINS CLASSIFIER. Power costs are low . . . . maintenance negligible. Unloading is unnecessary to start after shutdown.

No elaborate arrangements essential for flexible operation. Let one of our engineers present the facts in detail.



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SKINNER MULTIPLE HEARTH ROASTERS
BALL, ROD & TUBE MILLS
SMELTING EQUIPMENT

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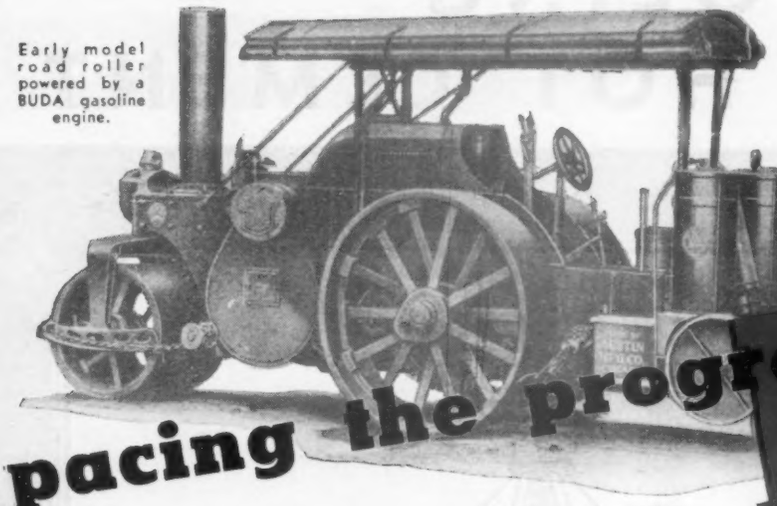
The Clyde Engineering Co., Ltd., Granville, N. S. W.

MAIN OFFICE & WORKS: DENVER 2, COLO., U. S. A.

BUDA *experience*

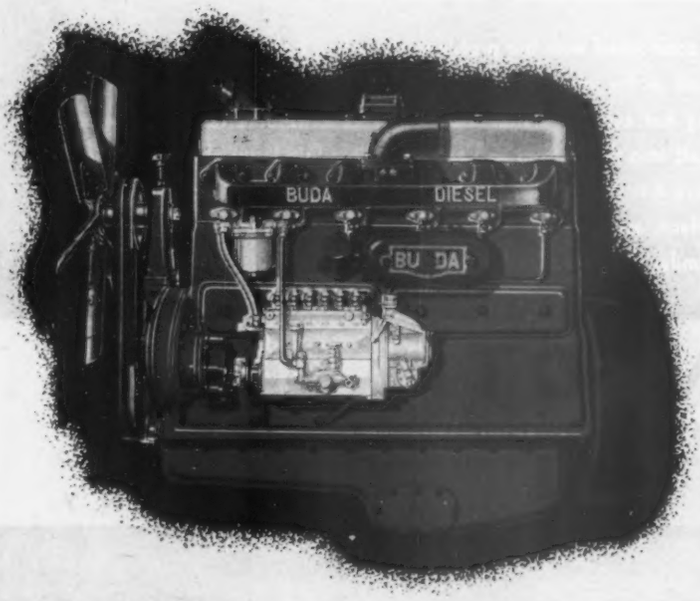
since 1881



Early model road roller powered by a BUDA gasoline engine.

pacing the progress of Power

Over 64 years of manufacturing experience and 35 years in the engine business is back of every engine BUDA design. Maximum power and economy are the result — and are as much ingredients of the finished product as the skill behind each accurately made part. Send for literature on BUDA engines — the most dependable power available for your job.



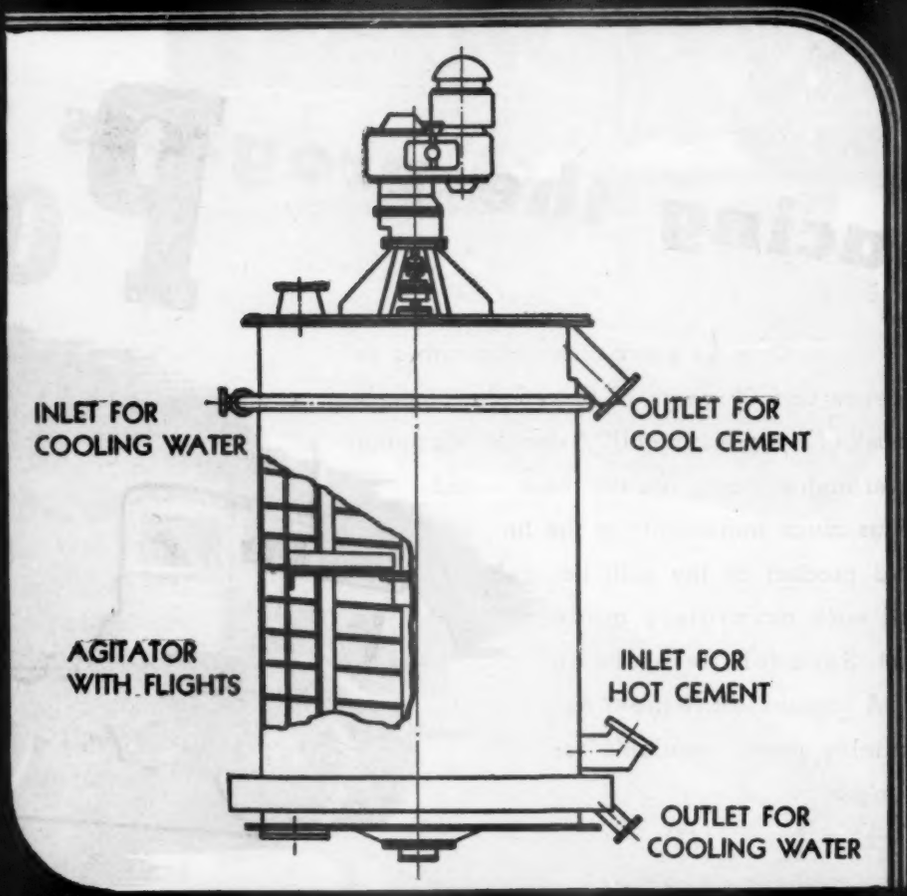
BUDA Jacks

BUDA Nozzle Testers

BUDA

15426 Commercial Ave.
HARVEY (Chicago Suburb) **ILLINOIS**

FOR COOLING HOT CEMENT



Cement manufacturers are frequently confronted with the problem of cooling hot cement to temperatures acceptable when making bulk shipments or for immediate packing in paper bags. The FLS Cement Cooler was especially developed for cooling hot cement. • The FLS Cooler consists of a tank, water-cooled externally, the cement being introduced into the bottom and conveyed in a thin layer along the inside of the water-cooled wall to the top, where it is discharged. Thus an intimate contact is established between the cement and the water-cooled surface, assuring high-cooling efficiency. • In addition to cement, the Cooler is applicable to many other similar dry pulverized materials.

F. L. SMIDTH & CO.

Designers of Cement Making Factories, Manufacturers of Machinery for Making Cement and Lime, etc.

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NEW... FULL-TIME OPERATING EFFICIENCY

with FAWICK CLUTCHES

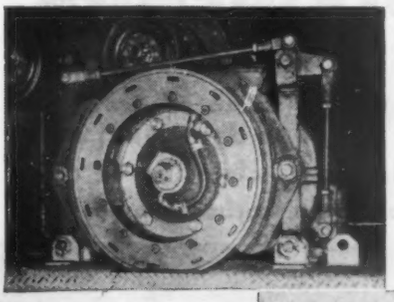
Keep them going—keep them free from down time—that's what Fawick Clutches do for earth-moving and material-handling machines.

This new Clutch controls power and torque through a cushion of rubber and air. It has no springs, arms or levers—requires no adjustments, no lubrication—has low maintenance costs.

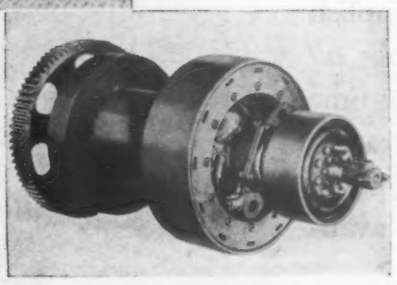
Let us help you engineer Fawick Airflex Clutches for your machines. Book on request.

The newest improved type of shovel is Fawick equipped—for more dependable, more economical operation.

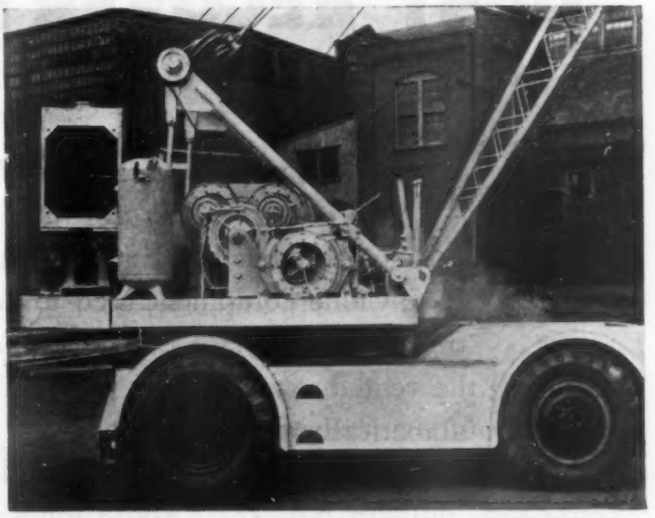
Fawick Clutches are providing new efficiency for shovels, cranes, draglines and hoists.



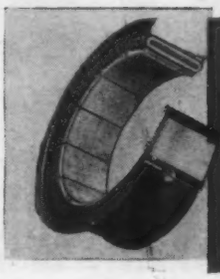
Main propel mechanism of the Shovel above—Fawick equipped.



Hoist drum assembly of the Shovel above—Fawick equipped.

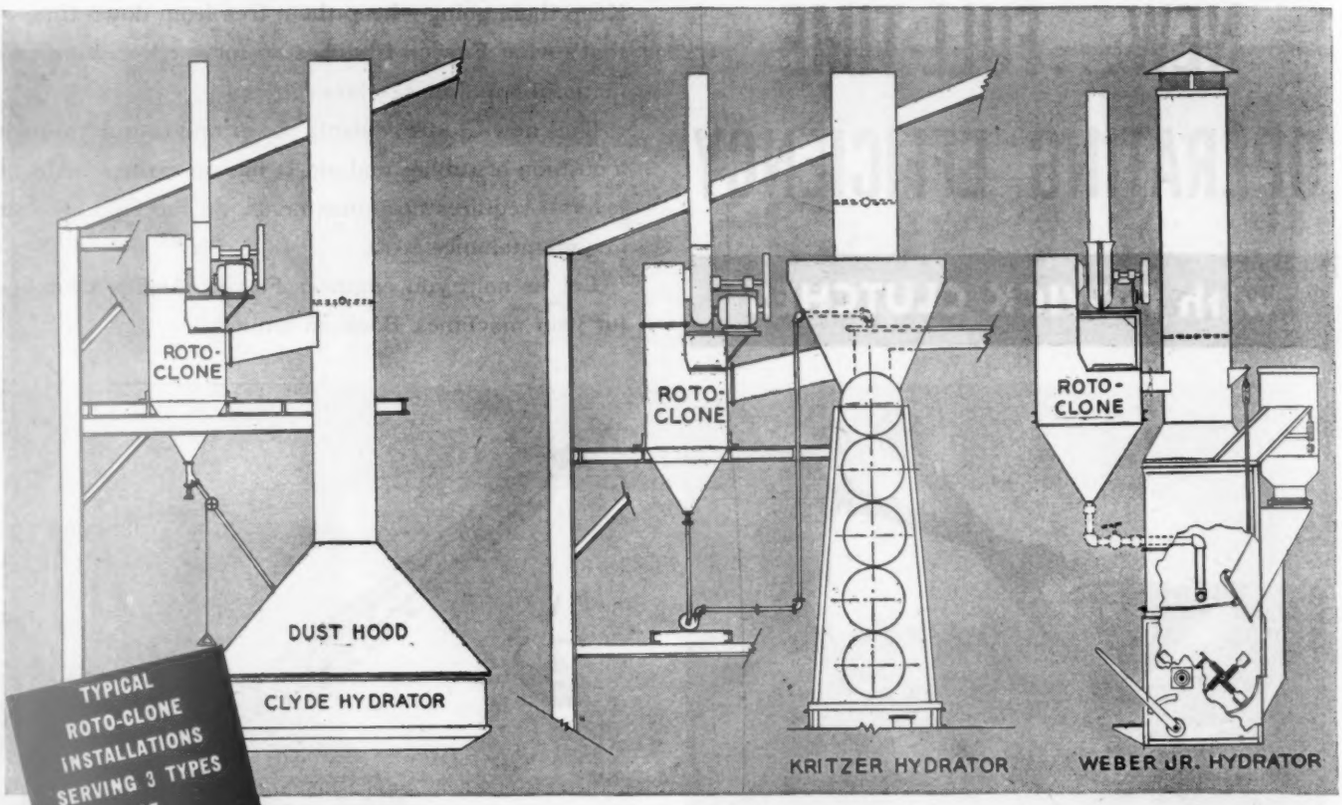


Seven Fawick Clutches are used on the new Byers ½ cu. yd. "Traveler".



FAWICK *Airflex* CLUTCH

FAWICK AIRFLEX CO., INC. • 9919 Clinton Road, Cleveland 11, Ohio

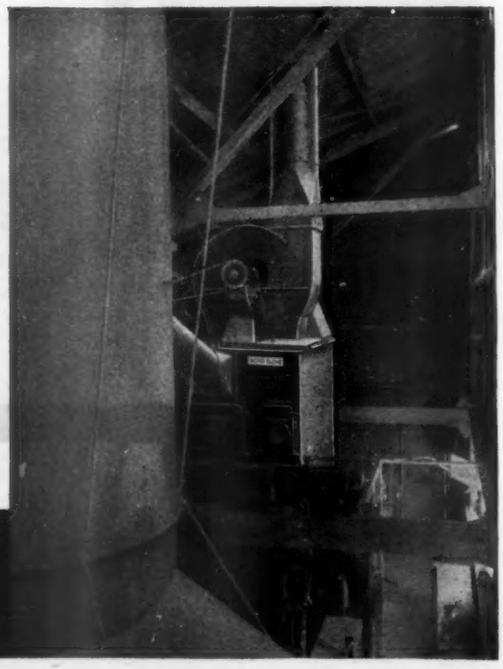


TYPICAL ROTO-CLONE INSTALLATIONS SERVING 3 TYPES OF LIME HYDRATORS

ROTO-CLONE MAKES LIME DUST RECOVERY PAY DIVIDENDS

Savings up to several tons of lime per day not only pay for the operating current, but also in time pay for the Roto-Clone equipment used to accomplish this remarkable job. After collecting *all* dust from the vented steam and air, the resulting lime slurry is automatically piped direct to the hydrating pan. Write for complete information and Type N Roto-Clone bulletin No. 277. Roto-Clones are available in capacities of 1,000 to 25,000 c.f.m.

- **Recovers up to several tons of lime per day's operation**
- **Eliminates cleaning of roof**
- **Stops neighborhood complaints**



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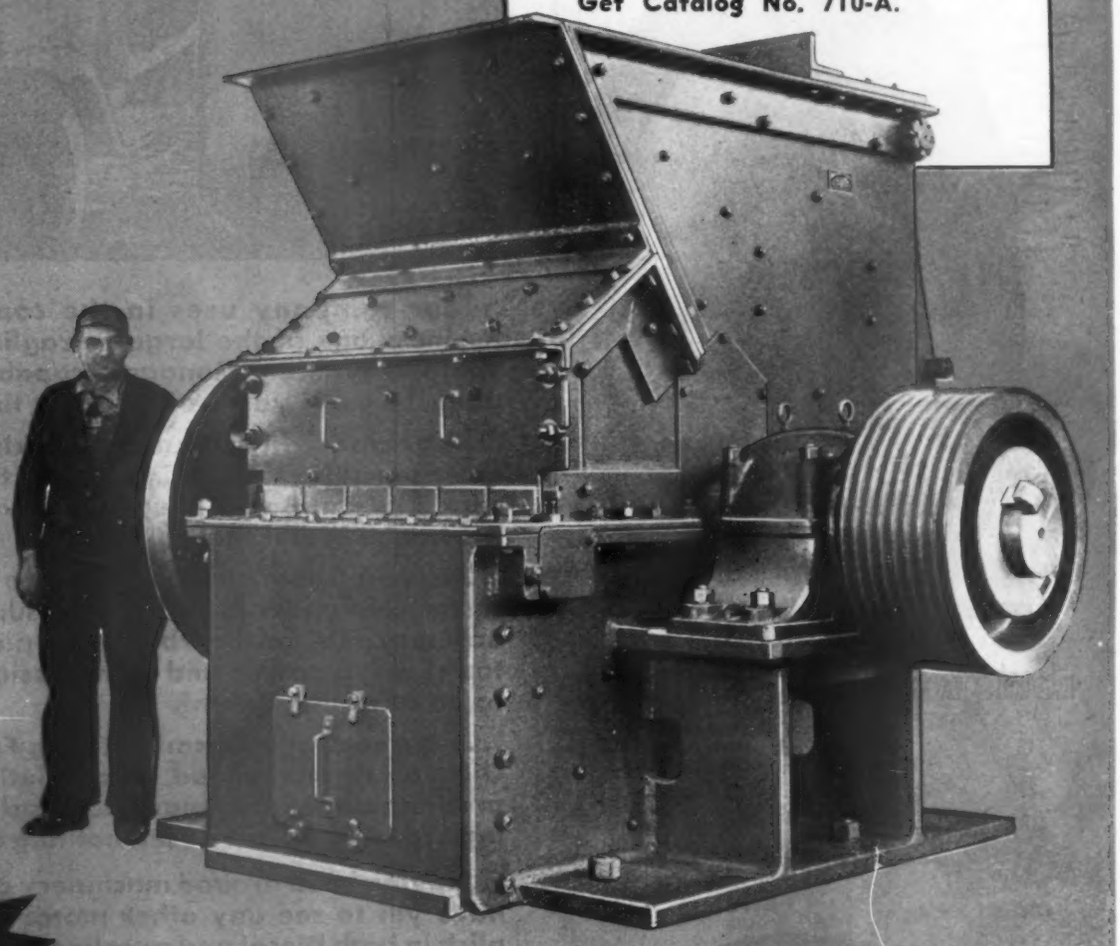
ROTO-CLONE
FOR ROCK PRODUCT DUST CONTROL

Whatever Your Needs

Jeffrey has the Crushers to REDUCE Your Material and INCREASE Production

Shown here is a large 54" x 30" Jeffrey Heavy Duty Hammer Crusher for reducing large capacities of hard and dense materials — rapidly and economically — to the size desired. Get Catalog No. 710-A.



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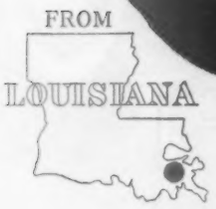

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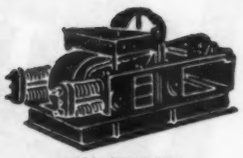
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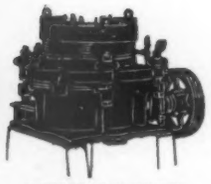
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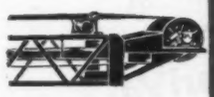
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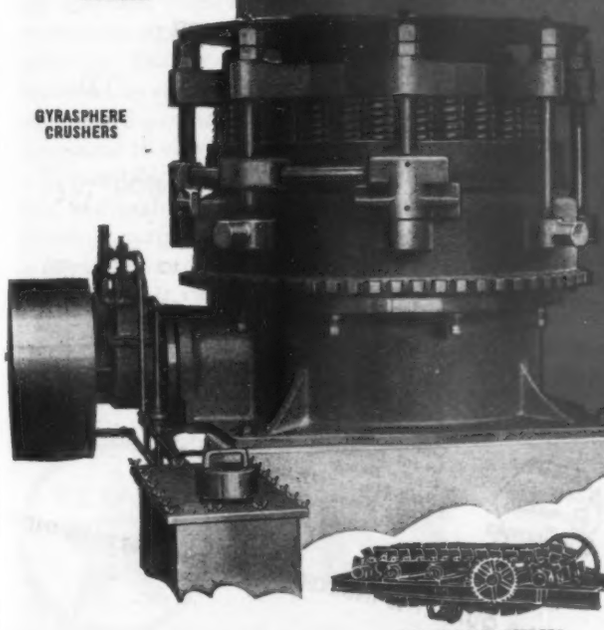
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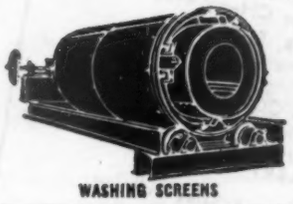
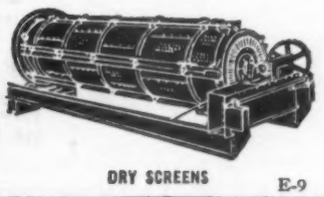
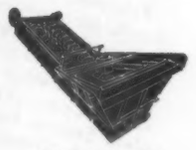

WASHING SCREENS


DRY SCREENS

E-9

PULSATORS

SAND TANKS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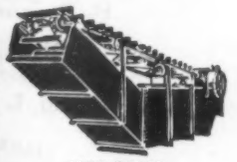
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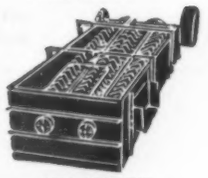
LOG WASHERS

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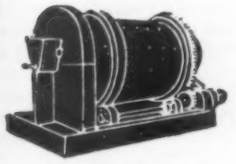
SUPER SCRUBBERS

PIT AND QUARRY

SEPTEMBER, 1945

Vol. 38 No. 3

CONTENTS

Editorial: The Election in Britain 62
News of the Industry 65
Washington News Letter 70
Agstone Producer Turns Out 1,000,000 Tons Per Year 71
Prospecting for Gravel Deposits 77
Mining Methods at Puget Sound Plant 81
Rotary Kiln Operation in Making Portland Cement—Part II 83
Crushed-Stone Directors' Conference 87
Wisconsin Plant's Capacity Doubled 90
Mexican Cement Industry's Exhibition 92
Average Hourly Wages in the Ohio Limestone Industry 94
The Lime Plant Operator 98

THE CONCRETE MANUFACTURER

News 131
Kaiser Replaces Two Seattle Plants 132
A Ready-Mix Producer's Cost Figures, Wage Rates and Prices 134
Terrazzo Firm Makes Wartime Shift to Concrete Bombs 136

Personal Mention 104
Obituaries 105
Legal Decisions 106
Traffic News 114
New Machinery and Supplies 117
Trade Notes 122

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PIT AND QUARRY IS INDEXED IN THE ENGINEERING INDEX

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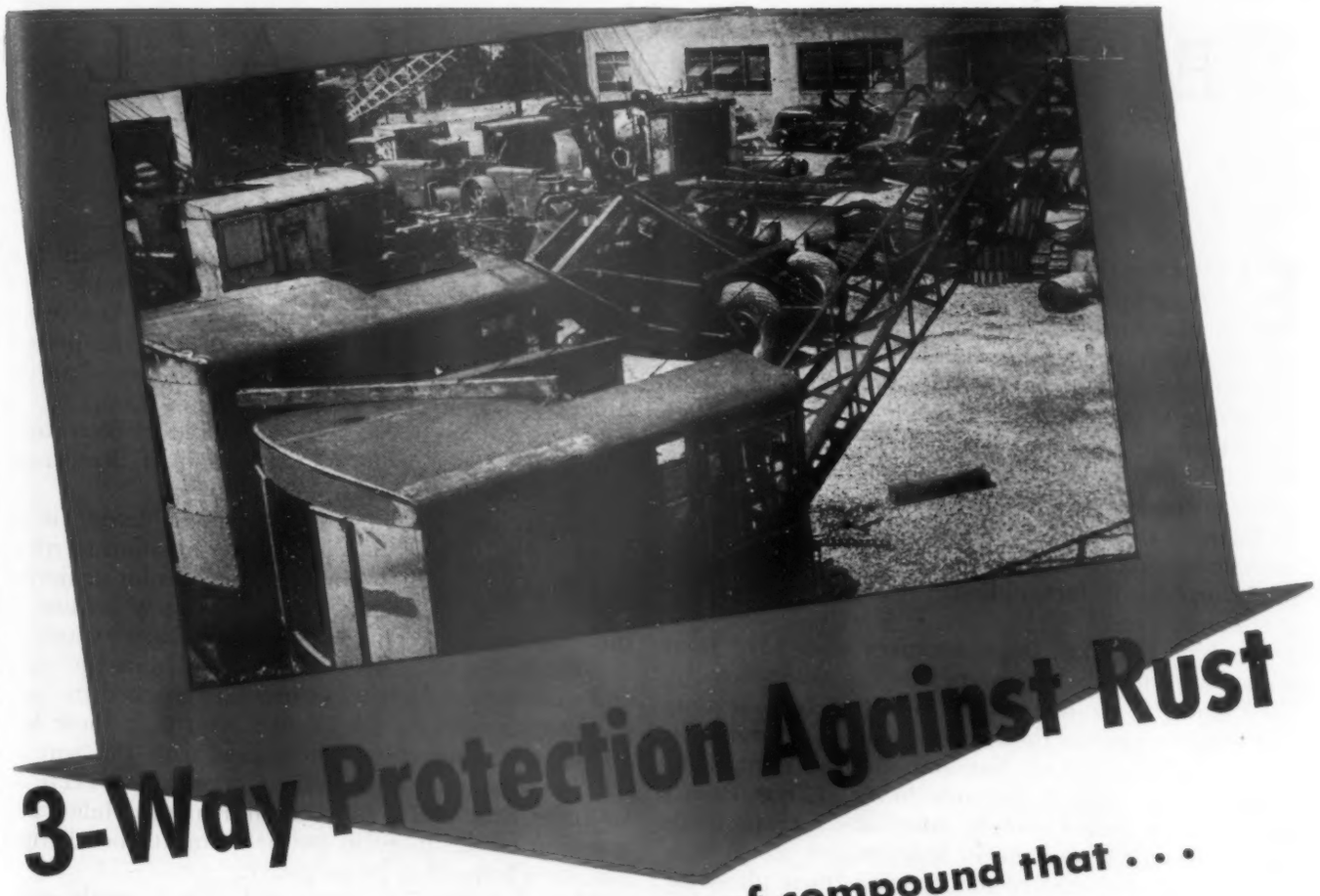

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EDITORIAL

The Election in Britain

EVER since the results of the recent British election became known, speculation on its probable effects on the American economy have been rife. Business men with whom we have talked seem, for the most part, to believe that it portends no danger to our system of private enterprise, that there is not enough similarity between economic conditions in Britain and the United States to justify the conclusion that a definite move to the left on the other side of the Atlantic will be followed by a like move here. However much this attitude may represent whistling in the dark, it probably has some basis in fact, although it is impossible to say how much.

Workers and their representatives who have been quoted appear to be encouraged by the victory won by the Labor Party in Britain and to be hopeful that some of the aims sought by those who voted for its candidates may be attained here. Nationalization of natural resources — the central principle in the Labor Party's program — is looked upon by many labor organizations and independent workers in this country as an ultimate, if not immediate, goal in their own plans for social and economic advance. They believe that its attainment in Britain will hasten its coming in America.

One of the notable facts about the British election, in addition to the size of the Labor Party's victory, is the extent to which success was dependent on the votes of the middle and professional classes, which, in previous elections, had supported the conservative and liberal parties. Of the 390 Labor Party members elected to serve in the House of Commons, 124 are labor-union officers, 48 are publishers, journalists and authors, 41 are business men, and 34 are lawyers, doctors and dentists. Less than half of the Labor Party membership of the new House of Commons, it seems, represents groups with "a selfish interest in the outcome."

As is usual in English political history, Britishers voted for parties — that is, programs and ideas — rather than for men. The Labor Party won out not only because it promised to do certain things but also because it told how they would be done. It charged certain industries with inefficiency, but it offered the people plans for eliminating it. Its program was designed to prevent a recurrence of economic depressions and to improve the lot of the average man.

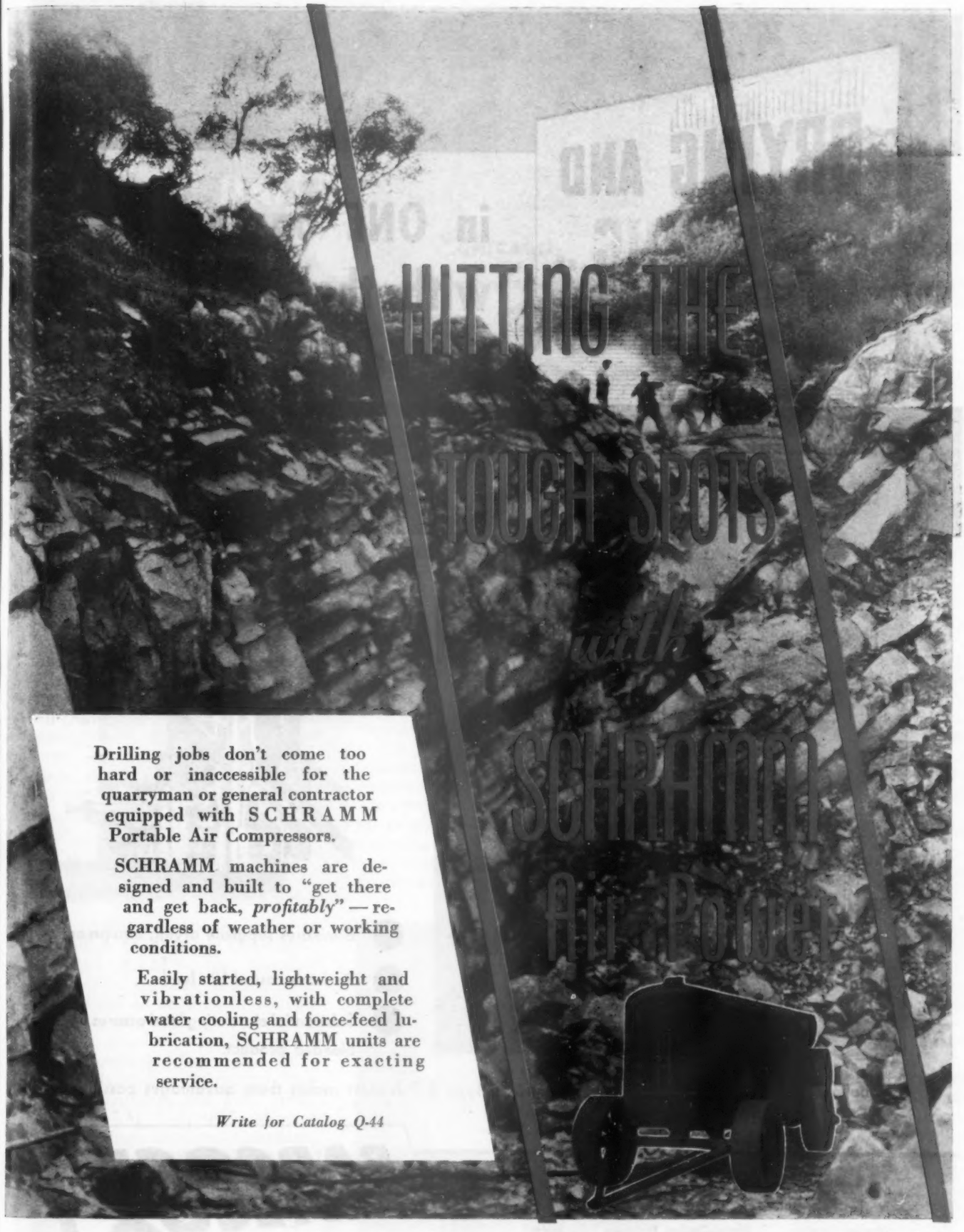
In its demands the Labor Party asked for jobs for all and for the creation of the high purchasing power which full employment brings. To attain that goal, it asked for the power to control rents and commodity prices; to make national investments in hospitals and other social services; to transfer to public ownership the country's natural resources (such as the mining of coal), the production of iron and steel and electric power; to take over banking; and to regulate agriculture. The party's program expressed a determination to "win the war on the home front, too."

Of the new House of Commons it has been said that it "is more representative of the British people than its predecessors, which were dominated by the vested interests." Similarly, it has been said of the present Congress that it is more nearly representative of all the American people than was any previous Congress. If both observations are correct, the peoples of both countries stand closer to a full realization of democratic government than they ever stood.

Britain's new government is definitely "leftist" in its nationalization goals and in its determination to make private enterprise subordinate to its plans for achieving full employment, yet it is in power largely because of the shift of many conservative and liberal voters to the Labor Party's cause. This swing from the right and middle to the left could not have reached the proportions revealed by the election returns, if there had not been nationwide dissatisfaction with the way in which the country's domestic economy had been allowed to drift and a lack of faith in the ability and intention of the party in power to make the changes that were believed to be necessary.

Though "leftist," as contrasted with its predecessor, the new regime in Britain will be socialistic rather than communistic — only two communists were elected — and for that reason it should not cause alarm among American business men. The weight of its authority will probably be felt more in the social field than in the economic. Competitive enterprise, as we in America know it, will probably not be disturbed except with regard to the exploitation of the nation's natural resources, because socialism, as the leaders of the Labor Party portrayed it, is not fundamentally opposed to competitive business operated for private profit.

THE surprise with which the result of the British election was received even in Britain is an indication of the extent to which governments with the means for ascertaining the wishes of their peoples can remain blind or indifferent to changing social and economic conditions. America passed through a similar experience in 1932, when an unexpected surge in public sentiment swept into power a party which, like the Labor Party after the recent British election, felt that it had been given a mandate by the people and instituted the New Deal as a means of allaying rapidly growing discontent. In both cases the failure to deal adequately with problems affecting the great majority of the people caused such widespread dissatisfaction that nothing short of a complete change in government would have been acceptable. If the British election holds any lesson for us — and we think it does — it is the truism that revolutionary policies and governments spring from the soil of public discontent and can not come into existence or last long in a climate reasonably free from social, political and economic injustice.



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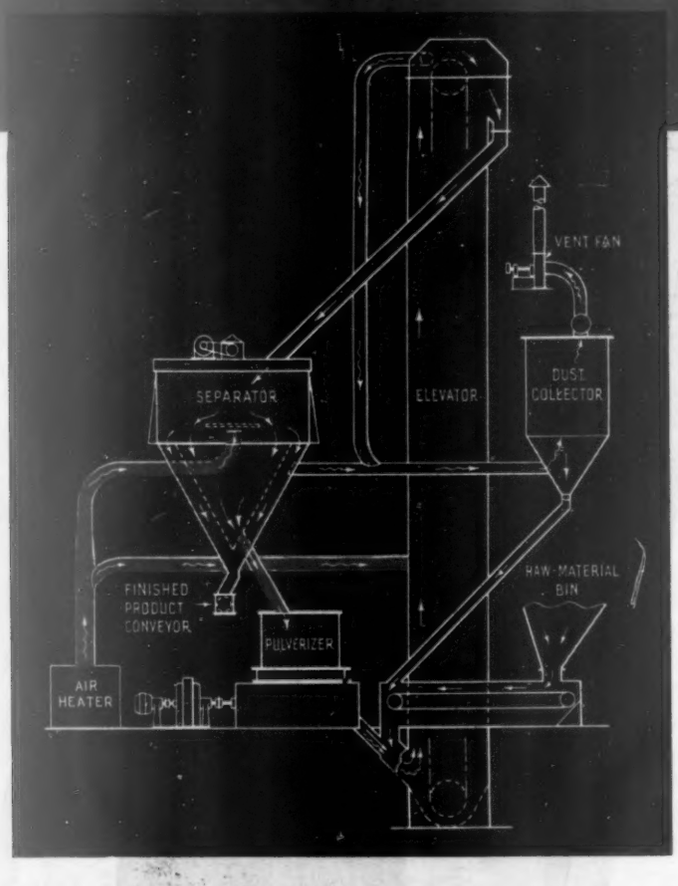

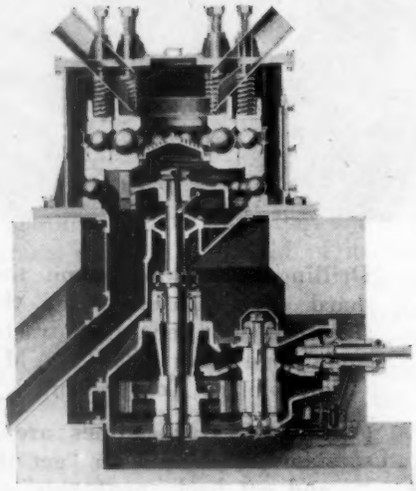

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PIT AND QUARRY

CHICAGO SEPTEMBER, 1945

Plan New Agency To Succeed A.A.A. As Hostilities End

The Agricultural Adjustment Agency, familiarly known as the A.A.A., the agency which spearheaded the government's drive for increased food production for the wartime emergency, passed out of existence four days after the announcement of the Japs' acceptance of Allied surrender terms. The A.A.A. was declared defunct by Agriculture Secretary Anderson, who announced that a new agency, the production and marketing administration, would supersede it. The successor of the A.A.A., said Secretary Anderson, will have the powers of the old agency, but will have a broader scope. No announcement has been made as to the govenment's post war program for the distribution of agricultural limestone to farmers.

Cancel A.I.M.E. Meeting Scheduled for October

In compliance with the ruling of the Office of Defense Transportation, the A.I.M.E. has cancelled plans for its regional meeting, originally slated to be held in October at Columbus, Ohio. Divisional meetings, however, have been tentatively planned as follows: Coal Division, Philadelphia; Petroleum Division, Los Angeles and Fort Worth or Dallas; Industrial Minerals (nonmetallics) Division, Columbus; Institute of Metals Division and Iron and Steel Division (separate meetings), New York City.

Cement from England Relieves Mexican Shortage

According to word from Mexico, a 3,000-ton shipment of cement has been received from England at Veracruz. Local producers welcomed the news that 100,000 tons of much-needed cement would be sent to Mexico to supplement the rapidly dwindling stocks on hand. Even small imports are expected to help relieve the shortage; but the foreign shipments may not benefit the interior, due to transportation difficulties.

Pioneer Industrialist For 44 years Dies

Harry F. Spier, president and general manager of the New Jersey Pulverizing Company since its organization in 1915, died July 8 in New York City. Mr. Spier had been in the industrial sand industry for forty-four years and was regarded as the pioneer of the silica grinding business in New Jersey. He was a charter member of the Industrial Sand Association and at the time of his death a member of its board of directors. From 1906 to 1915 Mr. Spier was general manager of the Pennsylvania Pulverizing Company.

Harry F. Spier

Japan's Resources In Minerals Mapped By Mines Bureau

With the defeat of the Japanese Empire and the impending occupation of the home islands by American and allied troops, the Bureau of Mines of the Department of the Interior has made public two large-scale maps of Japan proper showing the location of the important mines and metallurgical plants, oil refineries, synthetic oil plants and chemical works that fall to the control of the United Nations.

Described as sufficient for judgment with a "fair degree of accuracy" of Japan's position even prior to the surrender, information available by the bureau will be utilized by civilian and military authorities in administering the affairs of conquered Japan and planning the future.

The information gathered by the bureau reveals that Japan proper contains a great variety of minerals, but the country is not adequately self-sufficient in any class to support the vast industrial state that had been established before and during the war. In sulfur and pyrites, the home islands were self-sufficient, and elsewhere the Empire produced such things as arsenic, bismuth, coal, fluorspar, graphite, magnesium and tungsten. But of the vital metals and minerals that make a modern industrial state, Japan did not have enough. These included the ferrous metals, copper, zinc, lead, bauxite, petroleum, mica, mercury, tin, and many others.

Japan's chief strength was in its huge reservoir of docile labor, technical skill and inordinate ambition, coupled with the fact that a network has been built of modern iron, steel, aluminum, magnesium, copper, lear and zinc chemical works, in addition to fabricating plants, electrical, cement and other manufacturing plants, the bureau reported.

W.P.B. Chief Krug Tells Detailed Plan For Reconversion

The War Production Board's detailed plan for reconversion of industry to civilian production was made public by Chairman J. A. Krug soon after President Truman's announcement of Japan's unconditional surrender on August 15.

In effect, the plan calls for revocation of all possible controls, only those being retained which will be necessary to prevent industrial dislocation and bottlenecks which might prove harmful to re-employment and to assure stabilization. At the same time the Krug report stressed the fact that even the controls which are being retained would be revoked as soon as possible.

The high points of the plan are as follows:

All but a handful of orders will be cancelled within a few weeks.

A huge industrial building program will be released through a plan to relax industrial construction controls. This plan, designed to absorb the manpower and materials freed by military cutbacks, is already in effect, and additional relaxation will be considered within thirty days.

Ceilings on production of automobiles and other consumer durable goods will be removed. These important industries may now move forward with all-out production programs.

Orders controlling materials that are still in short supply, tin, crude rubber, textiles, lumber, etc., will be retained until shortages ease or until there is no longer any danger of a scramble.

Inventory controls will be retained until the danger of hoarding, pre-emptive buying and stockpiling by the few at the expense of the many are over.

Preferential protection of small business ($50,000 or less per quarter), including the rating system, will remain in effect for the time being until the effects of cutbacks can be appraised and it is safe to remove them.

The W.P.B. will retain its powers for breaking bottlenecks or giving protection where needed to military or highly essential civilian or export needs. These powers will be used only where necessary, and business should not rely on priorities help for conducting its normal activities.

In line with the President's letter to the W.P.B. chairman, the board will take vigorous action to expand production of materials which are in short supply to meet civilian demands and will work with O.P.A., W.M.C. and other agencies whose operations are of equal importance to the rapid expansion of such production.

Cement Company Serves As Ore Processing Plant

The Federal Portland Cement Company, Inc., recently disclosed that its Buffalo, New York, plant has processed 1,000,000 tons of iron ore since 1942 for direct charging into open hearth furnaces. This wartime conversion project has eased greatly the need for Swedish ore. The ore nodulizing work, done in the plant's two rotary cement kilns, which are not required for cement production during the war, is continuing at the rate of 40,000 tons a month. All the processing done is for the Bethlehem Steel Company's plants at Bethlehem, Pennsylvania, and at Sparrows Point, Maryland.

This procedure was fully described in an article in the January, 1944, issue of PIT AND QUARRY.

Cancel Plan to Build Cement Plant at Memphis

The Missouri Portland Cement Company at Memphis, Tennessee, has cancelled its plans to build a $2,000,000 cement plant, due to objections from the residents of the area. The firm will continue to manufacture cement in St. Louis and ship the product to Memphis for sacking and reshipment. The present plan is to construct a large distributing warehouse on Wolf River.

K. S. Schlesinger Heads Eastern Pulverizing Firm

Changes in the personnel of the New Jersey Pulverizing Company of New York subsequent to the death of the firm's president, Harry F. Spier, on July 8 were recently announced. Arthur B. Schlesinger became president and treasurer, and Arnold H. Tanzer, vice-president and secretary.

An announcement from K. S. Johnson and G. H. Ledford, new owners of the Deep Creek Gravel Company near Boring, Oregon, reveals that the name of the firm has been changed to the Deep Creek Stone Company.

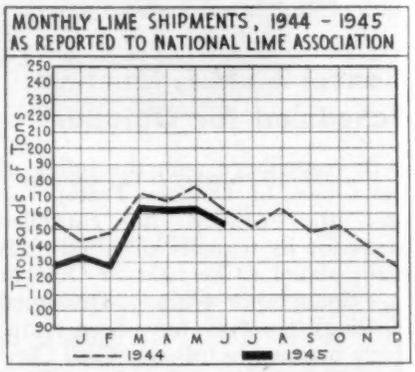
Marked Rise Noted In Privately-Owned Industrial Building

Marked by a pronounced recovery in privately-owned manufacturing building, construction activity in the thirty-seven states east of the Rocky Mountains showed substantial gains in the first half of the year, it was reported today by F. W. Dodge Corporation.

All major classifications of construction showed gains over the first half of last year except residential building, which was down slightly more than 3 per cent. The total of all construction contracts awarded in the thirty-seven eastern states during the first six months was $1,482,399,000, as compared with $960,221,000 in the corresponding period of last year, a gain of 54 per cent.

Nonresidential construction in the first half amounted to $807,612,000, in increase of 106 per cent. Residential construction declined from $203,892,000 to $197,509,000. Public works and utilities totaled $477,278,000, an increase of 31 per cent. Manufacturing building construction contracts aggregated $515,806,000 in the first six months, to establish a gain of 162 per cent. over last year's $197,077,000.

Privately-owned construction in the first six months represented 39 per cent. of the total of all contracts. It represented 25 per cent. of the total in the first half of 1944.



According to data collected by the National Lime Association, 454 companies in June, 1945, shipped 152,849 tons of lime (89,320 quicklime; 63,529 hydrate). Reporting companies represent 43.5 per cent. of the association members' total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry, the total shipments for the month by all plants were approximately 391,000 tons. Shipments of lime by users for June, 1945, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	1,040	19,957
Building	9,874	19,663
Chemical	78,406	23,909
Total	89,320	63,529

One-third Decrease Reported in Cement Production for 1944

The decline in production and demand for cements, which began in 1943, continued through 1944. Total production of 92,152,399 barrels of hydraulic cements reported to the Bureau of Mines, United States Department of the Interior, was 32 per cent. below the 1943 figure. This reduction results from respective decreases of 32 per cent. in the output of Portland cement and of a grouping of all other hydraulic cements (natural, masonry, pozzuolana, and hydraulic lime). The Portland cement industry operated at 38 per cent. and the "all other" group at 36 per cent. of productive capacity in 1944. Mill shipments were 26 per cent. below 1943 volume and totaled 95,592,155 barrels. Demand for Portland cement and the group of all other hydraulic cements, as gaged by shipments, declined nearly one-fourth from 1943. Stocks of all hydraulic cements at mills on December 31, 1944, were 19,976,371 barrels or 15 per cent. below the quantity on hand at the close of 1943. The average net mill realization per barrel of Portland cement increased 2 cents over 1943 to $1.59 in 1944, whereas that for all other hydraulic cements dropped 4 cents to $1.24 in 1944.

The decline in the long-term down trend of finished cement, which began in February, 1943, continued at an accelerated rate through the first four months of 1944. Easement in the rate of decline began in May and continued through the remainder of the year. Monthly production of cement from January through August, 1944, bore little resemblance to the usual peacetime seasonal pattern. Although the trend for January and February was similar to that of a normal period, actual production was much greater. This increase is attributed to a larger than usual proportion of construction in the Southern and far Western states, where structural activity was not seriously curtailed by winter weather. Peak 1944 production was reached in October. Monthly shipments in 1944 advanced from the January-February level of slightly more than 5 million barrels to 10,758,000 barrels in August, the largest monthly volume of the year. The volume fell off slightly through September and October and rapidly through November and December, reaching the lowest monthly quantity of the year in the latter month.

War controls on the cement industries were eased during 1944 and were directed primarily toward increasing the maximum price per barrel to compensate for increased production costs and declining sales volume. General Limitation Order L-179 on the Portland cement industry, which restricted the production of cement to three types: "normal", "high-early-strength", and "moderate-heat", effective August 23, 1942, was revoked on November 25, 1944. Maximum Price Regulation Order 224 of the Office of Price Administration was amended three times during 1944.

Expansion Planned At Bentonite Plant

The F. E. Schundler Bentonite Company at Belle Fourche, South Dakota, anticipates increasing its capacity by one-third by the addition of a fourth grinding mill and a fifth drier to its equipment.

A newly established sand-and-gravel company has been opened at Mt. Vernon, Indiana, by Charles E. Hagemann and son, Willford Hagemann.

Nonmetallic Industries Show Upward Trend In Canada in 1944

Preliminary compilations of statistics on Canada's nonmetallic industries for 1944 were released by the mining, metallurgical and chemical branch of the Department of Trade and Commerce. According to these figures, production of industries using nonmetallic minerals as their principal materials amounted to $406,934,995 at factory prices, an increase of 4.7 per cent. over the corresponding 1943 value — $388,713,942.

Capacity Increased At California Plant

Charles Warner, sand-and-gravel producer at Modesto, California, is increasing the crushing capacity of his plant by the installation of a second Kue-Ken jaw-crusher. His first machine of this make was set up several years ago.

N. Y. Firm Wins Contract For Bolivian Highway

A contract for constructing 250 miles of asphalt surfaced, all-weather highway between Cochaboma and Santa Cruz, Bolivia, has been awarded to Compania-McGraw-Warren, S.A., New York, by Corporacion de Boliviana de Fomento. The estimated contract price was $9,500,000.

Coplay Cement Division Presented with Navy "E"

The machine shop division of the Coplay Cement Manufacturing Company, Coplay, Pennsylvania, was presented on July 21 with its first star for the company's Army-Navy E award, won six months previously.

This is the Honorable Service Emblem awarded to veterans of the present war who have rendered honorable service to our country. Some of the men who are entitled to wear it will apply to you for reinstatement in the jobs which they left to answer the call of duty, and you will, of course, give them the consideration and help which the law and your own sense of gratitude guarantee them. Other

men will apply to you for work for the first time. Every one of these Americans will want a chance to prove himself useful and important in furthering the American way of life here, no less fully, no less eagerly, no less successfully than he strove while in service to preserve the democratic institutions and ideals that have made that way of life precious to us all.

Dolomite Concern Moves to New Site On Drummond Island

Drummond Dolomite, Inc., of Cleveland, Ohio, has dismantled its crushed stone plant at Sturgeon Bay, Wisconsin, and is moving all equipment to Drummond Island, near Detour, Michigan. The management states that the plant will be in operation in time for the opening of the navigation season early next year. The new site is located over a deposit of Engadine dolomite suitable for construction, chemical and metallurgical purposes. The annual capacity at the new plant is expected to be about 1,500,000 tons, slightly larger than that of the Sturgeon Bay location. Shipment will be by boat to points covered by the original plant.

An 1,875-kilowatt steam power plant was built on Drummond Island. The crushing plant is being built with used equipment including a Bucyrus-Erie 120B 4-cubic-yard electric shovel and five Euclid 12-cubic-yard quarry trucks.

Big Expansion Project Begins at Wausau Plant

A $500,000 modernization and expansion program has been initiated by the Minnesota Mining & Manufacturing Company at its Wausau, Wisconsin, plant. According to R. E. Gundlach, plant manager, the Wausau project, a part of a $7,000,000 post-war expansion plan of the company, is scheduled for completion by next spring. Work at Wausau has begun under the approval of the War Production Board's mining division.

Improvements will be made in the crushing-and-screening, the color-mixing and the dust-collecting facilities. An increased number of products is anticipated as one of the results of the expansion program. The firm also proposes to construct a new building at its St. Paul plant and a roofing granule plant in the South.

Strikers Not Striking Union Tells W. L. B.

At a hearing of the regional War Labor Board in Kansas City, Missouri, on August 6 officials of union members involved in the strike of last April at the Ash Grove Lime & Portland Cement Company, Springfield, Missouri, told W. L. B. representatives that there was no strike. In explanation they stated that the 65 workers who had left their jobs last spring had found other jobs and hence were no longer to be considered employees of the company on strike.

The W.L.B. officials, however, issued a back-to-work order and urged union spokesmen to call a mass meeting of the workers to persuade them to return. The walkout was caused by the failure of negotiations for a contract involving wage increases and a union shop.

A.S.T.M. Standard Index Now Available

Issued recently by the American Society for Testing Materials, the *Index to 1944 A.S.T.M. Standards* is a convenient means of locating approximately 1,200 specifications and tests in the Book of Standards. It also indicates whether the A.S.T.M. has issued standard specifications, test methods or definitions covering a particular engineering material or subject. Copies of the 220-page publication are furnished without charge on application to A.S.T.M. headquarters, 260 South Broad Street, Philadelphia 2, Pennsylvania.

ALCOA Offers to Run Two Government Plants

The Aluminum Company of America, through its regional manager, Robert A. Learnard, has announced that it has agreed to operate the Hurricane Creek Alumina plant and the Jones Mills aluminum plant near Bauxite, Arkansas, at the conclusion of the war. ALCOA specified, however, that it would not take over the Jones Mills plant unless it could buy or lease the alumina plant.

Correction

The article entitled *Chloroform Soluble Content Control of Air-Entraining Portland Cements,* published in the July issue of PIT AND QUARRY, page 119 et seq., contains two errors. First, the headings on Tables I and III should be transposed so that the heading of Table I will read "Relation of Mortar Densities and Chloroform Soluble Content" and the heading of Table III will read "Voids in Various Sand Combinations." Secondly, in the middle column of the text on page 121 the references should have been to Table III instead of Table I.

Sugar Rock Plant To Be Reopened In Salinas Valley

In California's Salinas Valley thousands of irrigated acres are being devoted to the growing of sugar beets for the big refineries of Spreckels, Union Sugar and other California processors. Large tonnages of agricultural limestone are required by the refineries, but high-quality deposits are relatively scarce. The quarry and plant opened in 1933 by Charles B. Taylor of Paso Robles, at Adelaida, was one of three supplying "sugar rock" for many years. About two years ago, illness forced Mr. Taylor to close the Adelaida plant. Now well on the road to recovery, Mr. Taylor is preparing to re-open the plant and quarry.

New equipment is being installed, and the plant is expected to employ 50 to 60 persons at the peak of production. Output will be about three times what it was formerly.

Three Workers Killed In Iowa Gypsum Mine

An accident fatal to three workers occurred on August 11 at the Certainteed Products Corporation mine near Fort Dodge, Iowa. The three men, John Pobejecky, Ben Davis and Leonard Peart, were trapped under a fall of rock in the gypsum mine. They had entered the mine to move rock which had been blasted the previous day and were caught when a section of the mine roof collapsed.

Mexican Cement Plant Gets U. S. Equipment

It has been announced that the new cement plant of Cementos Portland del Bajio, S. A., at Leon, Guanajuato, Mexico, which is nearing completion will use twelve Merrick Feedoweights. Two will be used to proportion limestone and clay and ten to proportion clinker and gypsum to five finish-grinding mills.

Cementos Vera Cruz, S. A. Opens New Orizaba Plant

The new plant of Cementos Veracruz, S. A., at Orizaba, Veracruz, Mexico, was scheduled to open officially on September 8. (See PIT AND QUARRY, July, 1945, page 114.) Mexican cabinet members, state governors, ambassadors and foreign ministers were among those invited to attend the opening ceremonies.

Highway Improvement Programs Pushed by Progressive States

Louisiana, Massachusetts, Oklahoma, Illinois, South Carolina and California are among the states reported to be making progress in their highway improvement programs. In Louisiana, Governor J. H. Davis and D. Y. Smith, highways director, have outlined a $350,000,000 highway expansion program which they anticipate will require at least 10 years to complete. The construction of new multi-lane concrete highways and two-lane highways, in addition to repairs and improvements on these thoroughfares and on bridges, will be accomplished with state and federal funds, supplemented by revenue sources yet to be outlined.

A bill providing for a six-year $156,000,000 highway construction program in Massachusetts was signed recently by Governor Maurice J. Tobin. The undertaking will be financed entirely by gasoline tax receipts. In Oklahoma a $20,000,000 post-war federal-aid highway program will derive approximately three-fourths of this amount from state revenue sources, stated Chairman B. T. Childers of the highway commission. The Illinois legislature allocated $15,000,000 for the improvement of township roads.

South Carolina's highway commission voted to increase the state highway maintenance appropriation from $2,000,000 to $2,500,000. California's legislature gave final passage to an act to create a 14-member fact-finding committee, backed by a $100,000 appropriation, to study a 10-year highway construction program.

Canadian Plant Opens With Streamlined Units

The Schell Construction Company, Ltd., has established a new industry in Woodstock, Ontario, for crushing and washing gravel. The plant is equipped with the most modern type of crusher and washer and has a capacity of 110 tons per hour. Eighteen dump trucks are employed to transport the finished product to customers.

Peru's Penetration Roads Improved by Government

Government projects in Peru for that country's industrialization and the greater utilization of its natural resources have been reported progressing rapidly. The Peruvian Ministry of Public Works, directed by Carlos Moreyra y Paz Soldan, has stated that more than 750 miles of "penetration highways" linking coastal areas with the interior have been graded, 121 miles widened and improved, 405 miles prepared for surfacing and 31 miles paved with asphalt. In addition, many concrete and metal bridges have been constructed.

Commerce Bureau to Give Information on Building

Improved factual information on construction activity and interpretation of those facts for the benefit of the industry is planned by the Bureau of Foreign and Domestic Commerce, Amos E. Taylor, Director, declares in the annual directory issue of *The Constructor,* official publication of the Associated General Contractors of America.

A practical example of what can be done to provide information to guide business management, said Mr. Taylor, is the bureau's recent survey of business plans for capital outlays, including construction, during the year following victory in Europe.

1,000 Miles of Highways Proposed in Kansas

Recommendations have been completed by the Kansas highway commission for the construction of its share of a superhighway to connect the industrial centers of Kansas with those of other states. The program calls for more than 1,000 miles of new highway of adequate width and strength to carry the heaviest traffic. The contemplated program includes U. S. 24, U. S. 40 and U. S. 50 east and west across the state; U. S. 69 and U. S. 81 across the state north and south; and U. S. 75 as far south as Topeka.

$500,000 Crushing Plant Built for Army Project

Construction is under way near Marysville, California, on a $500,000 rock crushing plant which will furnish the material for a new $19,600,000 runway at the Fairfield-Suisun Army airbase in Solano County. The plant is expected to produce 250,000 tons of rock and gravel. It has been estimated that the project will require about six months.

1944 Lime Statistics Show Labor Shortage, Fewer Producers

The lime industry in 1944 experienced remarkably little change compared with 1943, according to figures submitted by producers to the Bureau of Mines. Sales of "open-market" lime totaled 6,473,563 short tons, receding 2 per cent. from the all-time high of 1943. The average price per ton advanced 8 cents. Quicklime represented 80 per cent. and hydrated lime 20 per cent. of the total, the same as in 1943. Sales of agricultural and refractory lime gained slightly, but building lime and that used in the chemical and processing industries experienced small declines.

The most difficult problem with most operators was shortage of labor. The steady decline in the number of producers contained in 1944, with a drop of 35 in the number of active plants. In 1944 lime was produced at 210 plants in 36 states and two territories.

Prison Agstone Plants Open in West Virginia

West Virginia now has two state-owned agricultural limestone plants, one near Baker and a second on Rich Mountain in Randolph County. The Baker plant began its program on August 1, and production at Rich Mountain was scheduled to begin by the middle of the month. The state also has contracted with the Electro-Metallurgical Company's plant at Alloy for the processing of 70 tons of high-grade limestone per day from waste matter.

Lehigh's Mitchell Plant Has Good Safety Record

At an annual meeting of the Lehigh Portland Cement Company held recently at the Mitchell, Indiana, plant, stress was laid on the continuation of the current safety campaign. Particular notice was taken of the year's record, which showed 12 months without one lost-time accident.

Major improvements and plants alterations are planned by the Pennsylvania-Dixie Cement Corporation at Kingsport and Richard City, Tennessee, and Clinchfield, Georgia. The total cost of the remodeling will be approximately $3,000,000.

WASHINGTON NEWS LETTER

another P Q exclusive

ALTHOUGH the end of "the worst war in history" brought the same pure joy to Washington as to every other American city, the capital today wears a grimmer aspect than most. The weight of responsibility hangs heavy here, and the first flush of exhilaration has given way to the sober realization that the world has changed, drastically and permanently. Also, we are all beginning to realize that we are not quite sure how best to change with it. So long as the war's end was a wish, a misty rainbow rather than a present reality, it was not too difficult to hold fast to the precious illusion that things could be as they were before the war. Now that we have to focus on it, it is only too clear that there is no going back; all our energies must be concentrated on deciding where we want to go in this new world in which we live, and how we are to get there most safely. Even if the frightening discoveries which hastened the cessation of hostilities had not been made, serious adjustments would have been necessary in our economic and political institutions in order to assure lasting international peace and adequate employment of productive resources. The shooting has stopped, but will it be possible to keep it stopped without making radical changes in our ideas of the sanctity of national boundaries? As for full employment, most of us have not yet decided how far we are willing to go in sacrificing individual liberties to achieve this end. Until the recent atomic developments, these were the urgent, the crucial questions of our time; and even with our inadequate comprehension of the world-shaking technological implications of atom-busting, it is evident that the successful resolution of these problems is now more important, and more difficult, than ever before.

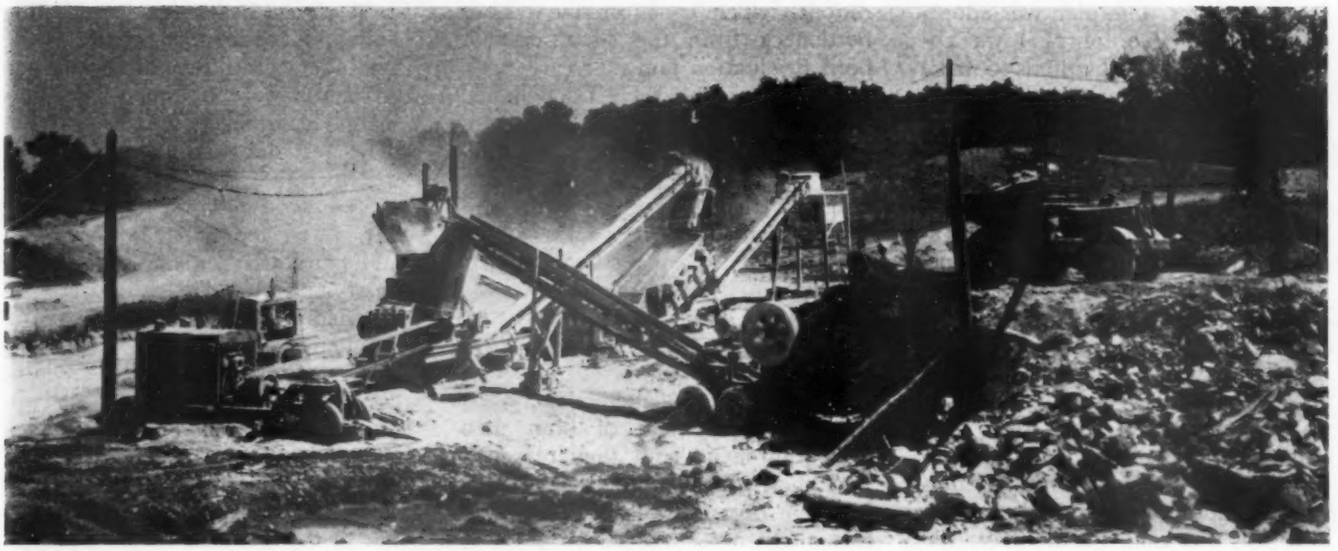
In the matter of adequate utilization of national productive capacity, the full employment bill now before Congress is a good beginning in the only direction open to us, but it is no more than a beginning. The recent endorsement of the bill by Secretary of State Byrnes, springing from a fresh appreciation of the intricate interrelationship of domestic and international policy in the new world, rounds out complete Administration sponsorship of the measure and virtually assures its passage, probably in its present form. However, this bill is only one element in a program still largely unformulated. By providing for a mandatory periodic review of the progress, status, and needs of the economy, the bill assures that there shall at all times be available to the pubic, as well as to the government which represents it, the organized economic data essential to intelligent executive action. But the bill itself makes no provision for such action. Rather, its whole emphasis is on procedures for study, review, and recommendation within the existing legislative framework. Thus, under the central provision of the bill, whenever the national employment and production budget to be submitted annually by the President indicates a deficiency in the prospective aggregate volume of investment and expenditure as against the volume required to assure a full employment level of national output, the chief executive is to set forth in the budget, "a general program for encouraging such increased non-Federal investment and expenditure, particularly investment and expenditure which will promote increased employment opportunities by private enterprise, as will prevent such deficiency to the greatest possible extent. The President shall also include in such budget such recommendations for legisation relating to such program as he may deem necessary or desirable. Such program may include, but need not be limited to, current and projected Federal policies and activities with reference to banking and currency, monopoly and competition, wages and working conditions, foreign trade and investment, agriculture, taxation, social security, the development of national resources, and such other matters as may directly or indirectly affect the level of non-Federal investment and expenditure." Finally, if this appears insufficient, the President is to transmit "a general program for such Federal investment and expenditure as will be sufficient to bring the aggregate volume of investment and expenditure by private business, consumers, state and local government, and the Federal Government, up to the level required to assure a full employment volume of production."

None of this is particularly bold or startling. Obviously, the President has always had the authority to recommend anything to Congress, particularly matters relating to the stimulation of the economy or to public works, and no more than this is called for in the bill. No new powers are conferred upon either the President or the Congress; any such powers would, as before, have to be the subject of new legislation. Yet, for all that it does not do, the bill has a definite and strategic importance. It is the opening gun in the struggle for economic stability, a statesmanlike declaration of government intentions that to the extent that continuing full employment cannot otherwise be achieved, it shall be the responsibility of the Federal Government to provide the necessary margin of investment and expenditure. Before the war, the desirability of fixing this responsibility might been the subject of extensive idealogical debate, but in the new world the overwhelming majority of people accept it as entirely natural and proper.

One minor provision of the bill is likely to set off some pyrotechnics in Congress. The national budget is to include a report on the distribution of the national income, presumably by income classes, during the preceding fiscal year and an estimate of the impact of the proposed budget upon income distribution in the year ahead. This subject has for long been super-sacrosanct, and Congress in the past has often discouraged its objective study by various government departments. Congressional concern, of course, is aimed at discouraging inquiries into the economic desirability of redistribution of the nation's income. One unfortunate result of this restrictive policy, as pointed out in a recent National Planning Association report, entitled "National Budgets for Full Employment," is that we do not have enough data on the relationships of personal income, taxes, savings, and expenditures at different levels of national income. Yet a change in the pattern of income distribution may be the only alternative to huge government expenditures. It is common observation, and this is substantiated by such studies as have been made, that higher income groups save a much larger share of their income than those at the lower end of the scale, who generally save little or nothing at all. The effect of adjusting the lower brackets upward, through selective taxation for ex-

(*Continued on page 76*)

AGSTONE PRODUCER TURNS OUT 1,000,000 TONS PER YEAR WITH PORTABLE PLANTS



General view of a typical Concrete Materials & Construction Company plant setup. The arrangement of the various units can be varied to suit the topography of the site.

another ON THE SPOT report

THE steady growth in the demand for agricultural limestone during the last decade has inevitably occasioned a parallel, though scarcely commensurate, development in the design of equipment and plants suitable for the production of a material which for for many years ranked as an undesirable by-product of stone-crushing operations. Throughout the period there has been an understandable tendency to focus attention exclusively upon fixed-plant operations, with the result that knowledge of portable agstone plants is today limited to the relatively few operators who are engaged in the business.

So far as is known, portable agricultural limestone plants were first developed in the state of Iowa by the Concrete Materials & Construction Company of Cedar Rapids. This firm had been exceedingly active for many years in both portable and fixed-plant crushed-stone operations, and had in common with most producers, always been able to market a portion of the screenings produced by its plants. There existed, however, as a result of the seriously eroded condition of southern Iowa farm lands, a latent demand for agstone which far exceeded the actual tonnages which were being sold, and the Concrete Materials & Construction Company set for itself the considerable task of converting this potential market into an actual market.

One of the most serious problems was financing. Through the years of the depression about 75 per cent. of the land had fallen into the hands

By WILLIAM M. AVERY

of insurance companies who were not much interested in long-range conservation programs, and the farmers themselves in the majority of cases lacked either the capital or the credit to go ahead. In 1937 a commission, formed to study ways and means of restoring Iowa farm lands to normalcy, invited Sidney Moore of Concrete Materials & Construction Company and Paul Nauman of the Dubuque Stone Products Company, Dubuque, Iowa, to offer their suggestions.

Mr. Moore and Mr. Nauman collaborated in the drafting of a plan which authorized the County Boards of Supervisors to contract with pro-

One of the ¾-cubic-yard gasoline shovels loading truck at a quarry face. Note wagon drill at right.

ducers to make agricultural limestone, and upon request of farm owners, to issue against the value of the land, warrants payable in five years to insure payment! Such warrants were to have priority over first mortgages. The plan was adopted, and the governor of Iowa appointed qualified individuals to make surveys to determine the need. Countless meetings were held in country school houses to promote the idea, and Mr. Moore's company put on liming demonstrations and launched a vigorous campaign to obtain low railway rates for agstone.

The first project was undertaken in Lucas County, Iowa, where the company agreed to set up a portable plant if 10,000 tons of orders could be developed. Eventually the plant was moved in on the strength of only 6,000 tons of advance orders in the hope that some additional tonnage would develop after the operation was started. Fortunately, the expected additional tonnage developed, and other projects soon followed, and the financing method proposed by Mr. Moore and Mr. Nauman operated successfully until the formation of the Agricultural Adjustment Agency.

In accepting the first grants made by the A.A.A. many farmers elected to take seed instead of agstone and as luck would have it, most of the seed froze out during the first severe winter. The agricultural limestone producers were quick to seize this opportunity to point out that the benefits of their material were not subject to loss, and that agstone was therefore the best investment the farmer could make with his grants under the A.A.A. program.

Portable agstone plants, as they have been developed by the Concrete Materials & Construction Company, have many inherent advantages over fixed plants. As the service end of this business — particularly spreading — has assumed major proportions, producers have found that many of their thorniest difficulties are due to weather conditions, which constituted a serious bottleneck from the standpoint of both production and delivery.

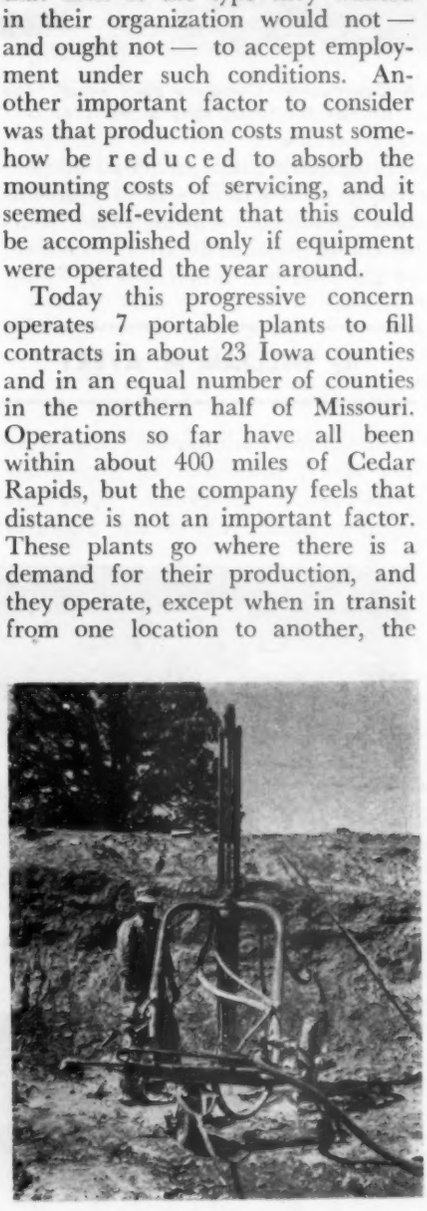
Mr. Moore and H. D. Bellamy, who are partners in the Cedar Rapids firm, recognized at the outset that it was absolutely necessary to have sufficient equipment and manpower available to produce the amount of agstone that farmers wanted *when* they could take it. To accomplish this objective with fixed plants in the sizable territory in which they planned to operate would inevitably have meant intermittent employment of both men and equipment, and they reasoned that men of the type they wanted in their organization would not — and ought not — to accept employment under such conditions. Another important factor to consider was that production costs must somehow be reduced to absorb the mounting costs of servicing, and it seemed self-evident that this could be accomplished only if equipment were operated the year around.

Today this progressive concern operates 7 portable plants to fill contracts in about 23 Iowa counties and in an equal number of counties in the northern half of Missouri. Operations so far have all been within about 400 miles of Cedar Rapids, but the company feels that distance is not an important factor. These plants go where there is a demand for their production, and they operate, except when in transit from one location to another, the year around. For the past several years the company has produced around 1,000,000 tons per year of agricultural limestone and 65 per cent. of this impressive output has been produced by portable plants. Fixed plants at Cedar Rapids and Moline, Kansas, accounted for the remainder. Until several months ago the plants were operated both day and night to keep abreast of contracts, but due to manpower shortages operations are being carried on at present on a day basis only.

It is believed that the company's 1944 production of agricultural limestone on a single-shift basis, was exceeded only by that of the Columbia Quarry Company.

The company has the enviable record of having always filled its contracts, and, as a result, much business has been secured that might otherwise have been unobtainable. This is particularly remarkable in view of the fact that the A.A.A. contract form is purely a device to assure a supply of material, rather than an agreement to buy a specific tonnage. Actual sales under a given contract almost invariably exceed estimates, and the entire organization has been built around the basic premise that orders must be filled regardless of any adverse circumstances which may be encountered. The company accepts all the responsibility for producing the material, trucking and spreading it, processing the orders and obtaining payments from the A.A.A. in Washington. It enters into contracts with truckers to deliver and spread the material, and makes immediate payments without requiring the truck operators to wait for the 60 days required for A.A.A. checks to clear. By rendering this complete service the company has gained a wide reputation for dependability and kept

Each plant is equipped with one of these 365-cubic-foot Diesel-driven portable compressors.



Wagon drill setup at an operation near Iowa City.

Power for the electric motors is furnished by this portable generating unit, built in the company's shop at Cedar Rapids.

Shovel and truck at the face of a quarry near Iowa City.

its men and equipment continuously employed.

There has been an understandable tendency to standardize plant equipment and design wherever possible, although the company's officials have shrewdly avoided the temptation to "freeze" designs. Changes are made promptly when sufficient evidence of their desirability has been accumulated, and the various operations are closely co-ordinated under a general superintendent so that improvements developed at any one of the plants are soon adopted at the others.

A single stripping crew is kept in the field constantly traveling from one quarry property to another and working well in advance of the production units. This crew is a self-contained group, operating its own trucks, flat-beds, five Caterpillar D-7 scoops and other necessary equipment. In addition a prospecting crew is maintained in the field to investigate new quarry sites at suitable locations. The company prefers to purchase stone properties outright whenever it is possible to do so, but a number of sites are operated under lease. Gardner-Denver 365-cubic-foot portable compressors, with Caterpillar D-13,000 engines, are operated by most of the portable plants. There has been no standardization on wagon drills, but Gardner-Denver, Cleveland, and Sullivan units predominate. To stay within the load limits permitted on Iowa highways the shovels used are limited in size to ¾-cubic-yard capacity. Link-Belt Speeder, Northwest and Koehring shovels are being operated. Each plant operates 3 Koehring 6-cubic-yard Dumptors; 2 machines are sufficient to feed the plant, but a third is maintained at each operation as a spare.

The primary crushing unit of a typical plant consists of a 36-inch by 8-foot steel-pan feeder, a 20- by 36-inch Cedarapids (Iowa Manufacturing Company) jaw crusher, and a 50-horsepower motor mounted on a 6-duo-tired-wheel welded-steel chassis. The chassis is backed up to a timbered earth ramp from which the Dumptors discharge onto the feeder. Jacks are used to level the unit and to take the principal load off the tires. The crusher is set to reduce the material to between 4 and 5 inches.

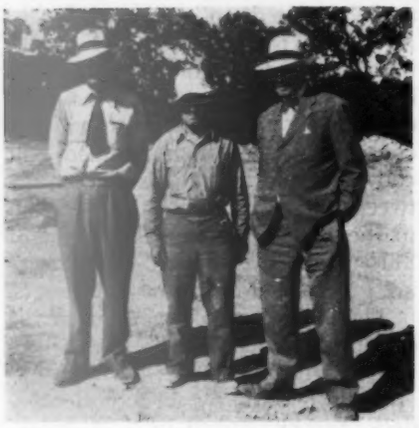
The pulverizing unit consists of two No. 40 Williams slugger type mills mounted on a single chassis. Each mill is driven through a flat belt by a Caterpillar D-17,000, 150-horsepower Diesel engine mounted on wheels. The jaw crusher discharges on a 24-inch inclined belt conveyor, and the flow is divided between the two mills. In addition to the lime grates which are set at 3/16 inch, two 2-inch rock grates are generally used in the pulverizers.

The largest and most recent of the screening units which have been used in the company's portable operations is a 6- by 14-foot double-deck Tyrock, driven by a 20-horsepower motor. Three of these machines were purchased recently and mounted on rubber-tired chassis to increase the screening capacity of the plants. For portability one large screen on each plant is considered to be preferable to two smaller units.

The belt conveyor from the pulverizer discharges on a 3- by 8-foot single-deck gravity screen which is mounted above the vibrating screen; for wet weather a little additional screening capacity is thus obtained. The gravity section has 3/16-inch openings, while there are 1-inch and 1/8-inch openings in the main screen. On the top deck of the main screen the openings are 1-inch and on the bottom deck 1/8-inch. Oversize material from the bottom deck is returned to the pulverizers by a belt conveyor, and the finished material is conveyed to a Cedar Rapids loading bin.

It was the experience of this firm that despite all the pleas and threats that could possibly be made, superintendents would periodically neglect to shut down and change hammers and grates when the product became too coarse. Closed circuits

Truck dumping to pan feeder ahead of 20- by 36-inch jaw crusher. Heavy chassis for these units are generally built in the company's own shops.



Left to right: Marvin Nelson, general superintendent; Harry Merryfield, superintendent of one of the portable plants; Sydney Moore.

have now been established at all the plants in order that the size of the finished product may be controlled without regard to the condition of the hammers and grates. With this safeguard the carelessness of a superintendent will be quickly revealed in the quantitative production of his plant, but the quality of the output is not jeopardized. From 30 to 40 per cent. of the total load on a plant is normally circulating.

By means of a throw gate in the screen the minus-1-inch plus-1/8-inch stone, instead of circulating back to the pulverizers, may be loaded into a separate bin and sold as aggregate or road stone. Other top limits may, of course, be produced by simply changing the size of the screen on the upper deck. The proportion of such special sizes of material may be increased by making adjustments at the pulverizers, and in a pinch any one of the 7 portable agstone plants would probably do very well on the production of either roadstone or concrete stone. A plant will produce from 60 to 75 tons of finished product per hour.

Electric power for the 50-horsepower primary crusher motor and the 20-horsepower screen motor and the four 10-horsepower conveyor motors is furnished at each plant by a self-contained portable generator. This unit, which consists of a D-13,000 engine direct-connected to a Caterpillar self-regulating, 75-kw. a.-c. generator, is assembled by the company's own mechanics at the shops in Cedar Rapids, and like all the other unitized portions of a typical plant, it is mounted on rubber-tired wheels for speedy movement over highways. All wiring, controls, panels and connectors are built into the machine before it leaves the shop. The generator also provides a means of illuminating the scene when night work is necessary.

The economies of portable-plant operation strongly urge the provision of generating equipment to handle all but the pulverizer motors, and the Concrete Materials & Construction Company is justifiably proud of the portable unit it has designed. Three of these generating outfits are included in a large crushing plant now working on company contracts in Venezuela.

A small office trailer accompanies each plant from job to job, and the 23,000-pound Fairbanks platform scale at each quarry site is fully portable if it becomes necessary to move it. Since weather conditions, the vagaries of farmers and the chronic shortage of trucks all make

One of the pneumatic-tire-mounted 150-horsepower Diesel engines used to drive the pulverizers. Flat drive belts are used.

it practically impossible to deliver material as fast as it is produced, open stock piles are accumulated at the various quarry sites and deliveries are made when the farmers want them. For this reason the platform scale and a loader of some type remain on the job after the crushing-and-screening plant has moved on to another location, and loading-out activities continue as

One of the 6- by 14-foot double-deck portable vibrating screens. Chute above is actually a gravity scalping screen.

The pulverizers are mounted on a single chassis, but have individual 150-horsepower Diesel drives.

The 2,300-pound platform scale and scale house are left at the site of each operation when the plant moves out, in order to continue shipments from the stock pile.

The creation of stock piles, such as the one pictured above, is absolutely necessary in order that adequate shipments may be made when the farmers want them.

long as the weather allows. Generally, the company has 150,000 to 200,000 tons of agstone in such stock piles throughout southern Iowa and northern Missouri. There are at present about 12 quarries owned or

Practically all deliveries are made in spreader trucks. The unit pictured is also manufactured in a larger size with two feeders.

leased by the firm in Iowa and an equal number in Missouri. Two men are employed constantly in the field for the sole purpose of expediting deliveries.

The nerve center of the entire organization is in Cedar Rapids, where the executive offices, a large fixed-plant operation and the yards and shops are located. Enough extra equipment is kept on hand so that any conceivable unit or part can be replaced on short notice. The well-equipped shops have played an important role in maintaining continuity of operations by eliminating long repair shutdowns. If, for example, a power unit breaks down at one of the plants, a replacement is sent out by truck immediately, and the faulty equipment is brought back to the shop where skilled mechanics can make the necessary repairs under optimum conditions. In addition to eliminating costly production delays, the central shops have brought about far better maintenance standards at lower ultimate cost than could possibly be achieved in the field.

Particularly since the outbreak of the war, it has been necessary to maintain a large inventory of parts and materials in order to keep all the plants operating at peak efficiency. By purchasing such items in volume and storing them at the Cedar Rapids plant, the company has avoided the ruinous delays that have bedeviled smaller operators through the war years.

Cedar Rapids is also the home port of the considerable fleet of trail-

Spreader truck loading under the bin at one of the company's properties near Mount Pleasant, Iowa.

ers and flat-beds which are used for moving the plants. When tires were plentiful, it was not particularly unusual to shift a plant with the loss of only two or three days' production. The average time required under present conditions is more than this, but, considering the size and complexity of the equipment involved, the operation is still an eloquent endorsement of the value of careful planning and organization.

Mr. Bellamy and Mr. Moore have operated on the theory that men are the truly vital part of their business. Most business men of today are willing to give lip service to this premise, but the Concrete Materials & Construction Company has endorsed it repeatedly by formulating definite policies with respect to wages, continuity of employment and promotions. Although the materials produced do not ordinarily move in inter-state commerce, the company voluntarily elected to comply with the wage and hour provisions of the Fair Labor Standards Act, recognizing that only by the payment of adequate wages could it hope to keep men of the desired qualifications.

Another somewhat unusual policy and one which has yielded unexpected dividends through the war years, is that of grading men for the purpose of establishing their wage rates. This policy was originally formulated in recognition of the fact that men differ too widely in experience, ability and performance to justify the establishment of

Wagon drills are used exclusively for primary drilling in all the company's portable operations.

Statement

Project _____ Total Production for Period _____

	Man Hours	Labor	Ton Cost	Fuel	Ton Cost	Other Expense	Ton Cost	Man Hours	Repair Labor	Repairs	Total Repair	Ton Cost			Rental	Ton Cost	Total	Ton Cost	Company Rental	Ton Cost	
MOVING																					
Loading																					
Transportation																					
Unloading																					
Total Moving																					
SET UP																					
Total Set Up																					
STRIPPING																					
Total Stripping																					
DRILLING																					
Primary Drilling																					
Secondary Drilling																					
Well Drilling																					
Drill Steel																					
Drill Bits																					
Total Drilling																					
SHOOTING																					
Primary Shooting																					
Dynamite																					
Caps																					
Total Primary																					
Secondary Shooting																					
Dynamite																					
Caps																					
Total Secondary																					
Total Shooting																					
CRUSHING																					
Shovel																					
Pit																					
Plant																					
Power																					
Pulverizer																					
Tires																					
Misc. Expense																					
Total Crushing																					
Bulldozer																					
Light Plant																					
Water Pump																					
Pick Up																					
Non-Productive																					
Freight																					
Gas Force Account																					
STOCKPILE																					
Trucks																					
Labor																					
Shovel																					
Total Stockpile																					
Telephone and Telegrams																					
Office Expense																					
Supervision																					
Timekeeper																					
Watchman																					
Scale Man																					
Social Security Insurance																					
SUB-TOTAL																					

The company's outstanding success in portable plant operations is in part due to the compilation of complete cost data at the conclusion of each setup. Costs are broken down on the form pictured above.

a single fixed rate for a particular job. Each employee is graded, for the purpose of fixing his rate of pay for a given job, into one of three categories — A, B or C — giving weight on a point basis to the amount and kind of experience he has had, his all-around ability, his willingness to accept responsibility, honesty, sobriety and various other factors. An A rating, for which the highest number of points is required, automatically qualifies him for the maximum rate established for his job, while a C rating carries only the minimum wage. The ratings are reviewed frequently in order to upgrade qualified men as quickly as possible, and the records thus accumulated have been of incalculable assistance in obtaining approval from the National War Labor Board on applications for increases. Untold thousands of applications filed by industry have been denied since the board was created because they provided no data or insufficient data to support the pleas for wage adjustments.

Most of the company's superintendents are paid an annual bonus based on the overall profits for the year rather than on the profit realized from the individual operations under their control. Personal performance, faithfulness and industry are also taken into account in making the distribution. By basing it upon the net profit of all the plants there is no danger of penalizing a man who has worked hard and well under adverse conditions beyond his control.

Complete cost data are compiled at the conclusion of each job from reports sent in daily by the superintendents. These figures are broken down into the cost per ton of each and every phase of the operation, from moving and set-up expense, through stripping, drilling, shooting and crushing. Maintenance costs are prorated among the various plants on a tonnage basis at the end of the year. The availability of these data has made it possible for the company to obtain necessary price increases from the Office of Price Administration, and they have been of incalculable benefit in analyzing the performance of its equipment.

Gradation tests are made daily at each job in order to maintain strict compliance with specifications, and the company operates its own laboratory in Cedar Rapids for checking calcium-carbonate content.

The development of portable plants was made possible by the introduction of light-weight, highly portable crushers, and equipment manufacturers have worked closely with producers to open up and expand this still relatively new and challenging field. It is logical that the first successful large-scale operation of portable agricultural limestone plants should have occurred in Iowa, for there are said to be more light crushers built in Cedar Rapids than anywhere else in the world. With farmers in many sections of the country pleading for more and more agstone, the future of the portable plant seems bright indeed.

News Letter *(from page 70)*

ample, would be, by increasing individual expenditures, to abate the need for government spending. Since the NPA is widely regarded in labor, business, and government circles for its non-partisan approach to national economic problems, and in its report attempts to evaluate objectively various national budget models, its comment on the effect of income redistribution is worth quoting:

"In a dynamic economy, with a growing total income such as this nation must achieve, this can mean that more of the increase will go to those who need it most—but that everybody will benefit. Since the income actually received by, say, the lower half is inadequate for what we consider an American standard of living, such a change would clearly be desirable on general social grounds."

Plan Cement Storage Plant at Milwaukee

The Marquette Cement Manufacturing Company of Chicago recently leased for 30 years a tract of unimproved harbor land west of the Kinnickinnic mooring basin in Milwaukee, Wisconsin, to be the site of a modern cement storage and packing plant. The building, which will have an annual capacity of 100,000 barrels and will handle business amounting to $750,000 a year, is to be constructed as soon as possible.

Complete 70,000-Ton Plant to Make Agstone

The Callanan Road Improvement Company, a 62-year-old firm in Albany County, New York, has completed a $100,000 plant at South Bethlehem for the production of agricultural limestone. It will have a capacity of 70,000 tons of limestone annually. The Callanan company has recently been granted an extension of its original charter to perpetual existence.

The Ken Royce Company of San Francisco has announced the opening of a new limestone quarry at Rockaway Beach. The crushing and screening plant is said to have a capacity of about 250 tons per hour of crushed stone, agstone and poultry grits.

PROSPECTING FOR GRAVEL DEPOSITS BY RESISTIVITY METHODS DESCRIBED

By WOODWARD MOORE
Associate Civil Engineer, Division of Physical Research, Public Roads Administration

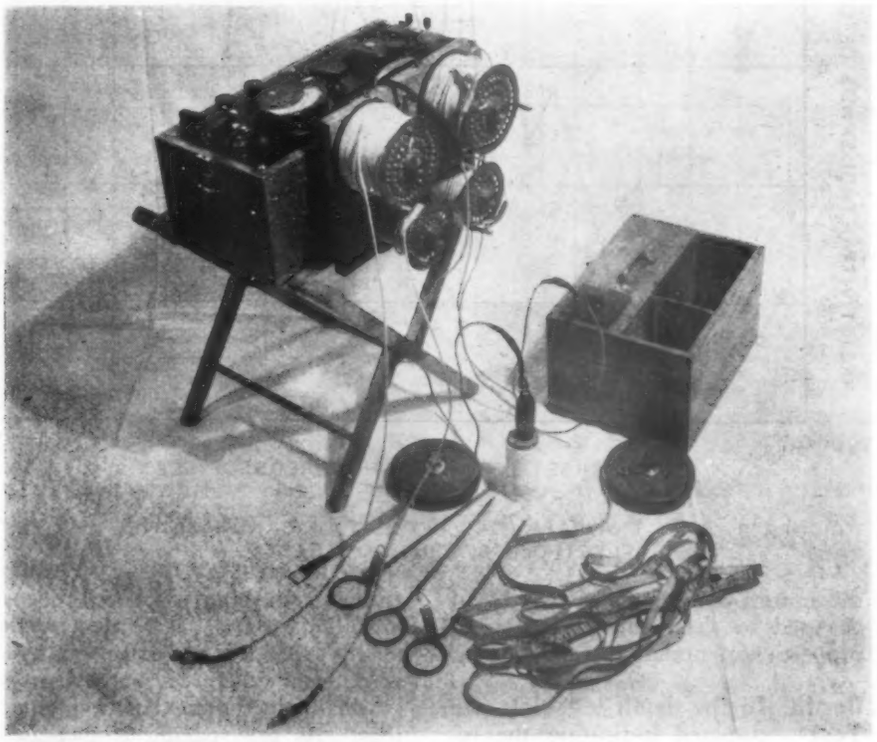


Fig. 1

another P and Q exclusive

RESISTIVITY methods of test have been used heretofore in locating sand and gravel deposits.[1] The possible usefulness of such methods of test should be reemphasized, however, and the following paragraphs, prepared for such a purpose, relate to data obtained in 1940 by the Public Roads Administration in field studies involving gravel deposits in the vicinity of Washington, D. C. These tests indicated that the earth-resistivity method of test may be applied with considerable success in areas where a sandy gravel is underlain by clayey sand, sandy clay, or a clay stratum.

Apparatus and Methods The resistivity test, as the name implies, involves measuring the resistivity of the materials lying below the ground surface. The presence of, and approximate depth to, any material having resistivity characteristics markedly different from that of the overlying or surrounding formations is revealed by variations in the resistivity values obtained. These are governed by the relative quantities of the materials involved.

The apparatus used by the Public Roads Administration is shown in Figure 1.[2] The three units, the instrument containing the potential and current-measuring devices, the battery box, and the reels of wire, can be readily carried over any ordinary terrain. The battery box, which contains sufficient batteries to supply approximately 200 volts to the current circuit, has compartments for carrying incidental equipment, such as tools, tapes, electrodes, etc. The potentiometer, mounted on the left-hand portion of the instrument panel, is equipped with a sensitive galvanometer (0.125 microamperes per milimeter on its own scale) and has a maximum range of 1.10 volts. The milliameter, mounted on the right-hand portion of the panel, is a sensitive unit equipped with shunts to give full-scale readings of 0-15, 0-75, 0-150, and 0-300 milliamperes. The potential electrodes consist of porous porcelain pots, such as the one shown in Figure 1, and they are filled with a saturated solution of copper sulphate in which is immersed a coil of heavy copper wire (No. 8 or larger). The current electrodes (not shown in Figure 1) are heavy iron rods about 2 feet long and 1¼ inches in diameter.

In making a resistivity test the apparatus is set up on an ordinary camp stool and the current electrodes are driven into the ground so spaced that one-third of the distance separating them constitutes the approximate desired depth of investigation. The two potential electrodes are placed at the third points between the current electrodes and all four electrodes are connected to the instrument by the wires provided for that purpose. A current of a few milliamperes strength is introduced into the ground, and a zero reading is obtained on the galvanometer of the potentiometer circuit by adjusting the potentiometer controls. The value of the potential drop set up in the potentiometer to balance that existing between the porous pots resting on the ground surface together with the value of the current flowing through the ground as obtained from the milliameter are inserted in an appropriate formula and the apparent or average resistivity of the ground is obtained. The underlying theory and diagrams showing the electrical circuits for the direct current method of test being described have appeared in an earlier report (2).

Step Traverse There are two tests commonly made with the resistivity apparatus, the step traverse and the depth test. In making a step traverse resistivity data are obtained that relate to the formations in the subsurface within a fixed depth which is controlled by the spacing of the electrodes on the ground surface. Experience has developed the empirical relation that the depth of the layer explored is approximately equal to the electrode spacing used. Thus, a 20-foot electrode spacing may be expected to yield information concerning a layer of material approximately 20 feet in depth. By maintaining this 20-foot spacing, and making tests at each 20-foot station or interval along a selected line of exploration, variations in resistivity are obtained which indicate increasing or decreasing amounts of material of high resistance, such as a

[1] Numbers in parentheses refer to references given at the end of this paper.

[2] See reference (2) for a more detailed discussion of the resistivity test and apparatus.

sandy gravel, within the depth involved. If the resistivity values are plotted as ordinates against traverse distances as abscissas, the variations in the subsurface formations within the 20-foot layer are reflected with fair accuracy by variations in the resistivity graph. A step traverse over a deposit of sandy gravel underlain by clay and clayey sand is shown in Figure 2.

When using this method of test in prospecting for gravel, the normal procedure is to make a series of tests along a random traverse line passing over likely locations. The proper electrode spacing is governed by the depth to which the information is desired. If a high-resistivity zone is found (Figure 2), other tests are made on lines parallel to the random line at 50- to 100-foot intervals. Additional tests are made along lines, similarly spaced, but differing in orientation by approximately 90 degrees. This results in data for points that approximate a grid and it is possible to plot a resistivity-contour map as shown in Figure 3.

When a pocket of gravel is indicated, further exploration is made by depth tests, and it is desirable to make a few direct tests with a 6- or 8-inch post-hole auger. Samples excavated from the bore holes show

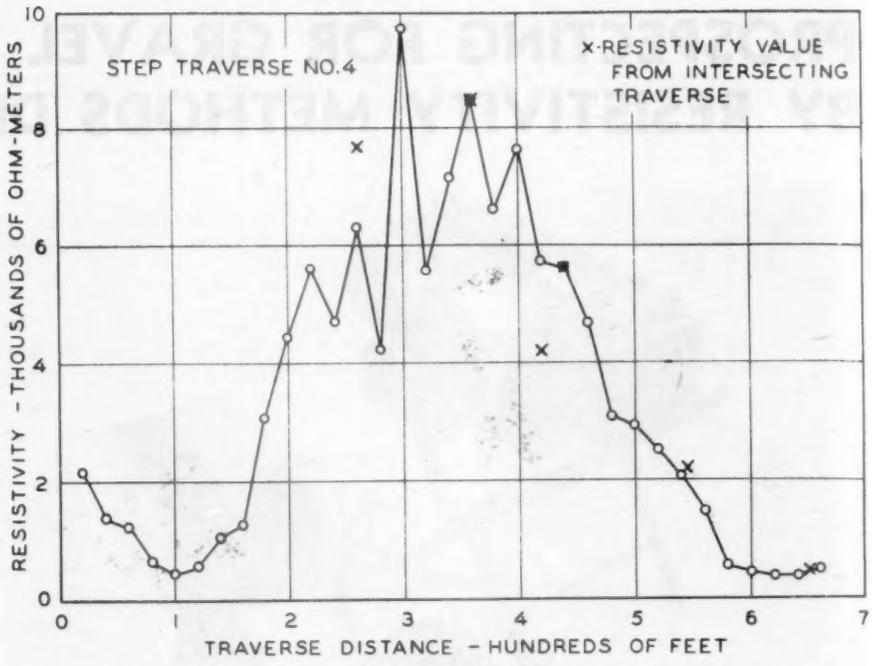


FIGURE 2 -STEP TRAVERSE OVER DEPOSIT OF SANDY GRAVEL — ELECTRODE SPACING 20-FEET

the nature of the material and can be used to determine the physical properties of underlying formations.

Depth Test In the depth test, data are obtained indicating the resistivities of the successive strata as probing is carried deeper into the ground. In this test the resistivity of the subsurface material is determined for a succession of gradually increasing electrode spacings. As the spacing is increased, the depth of the material controlling

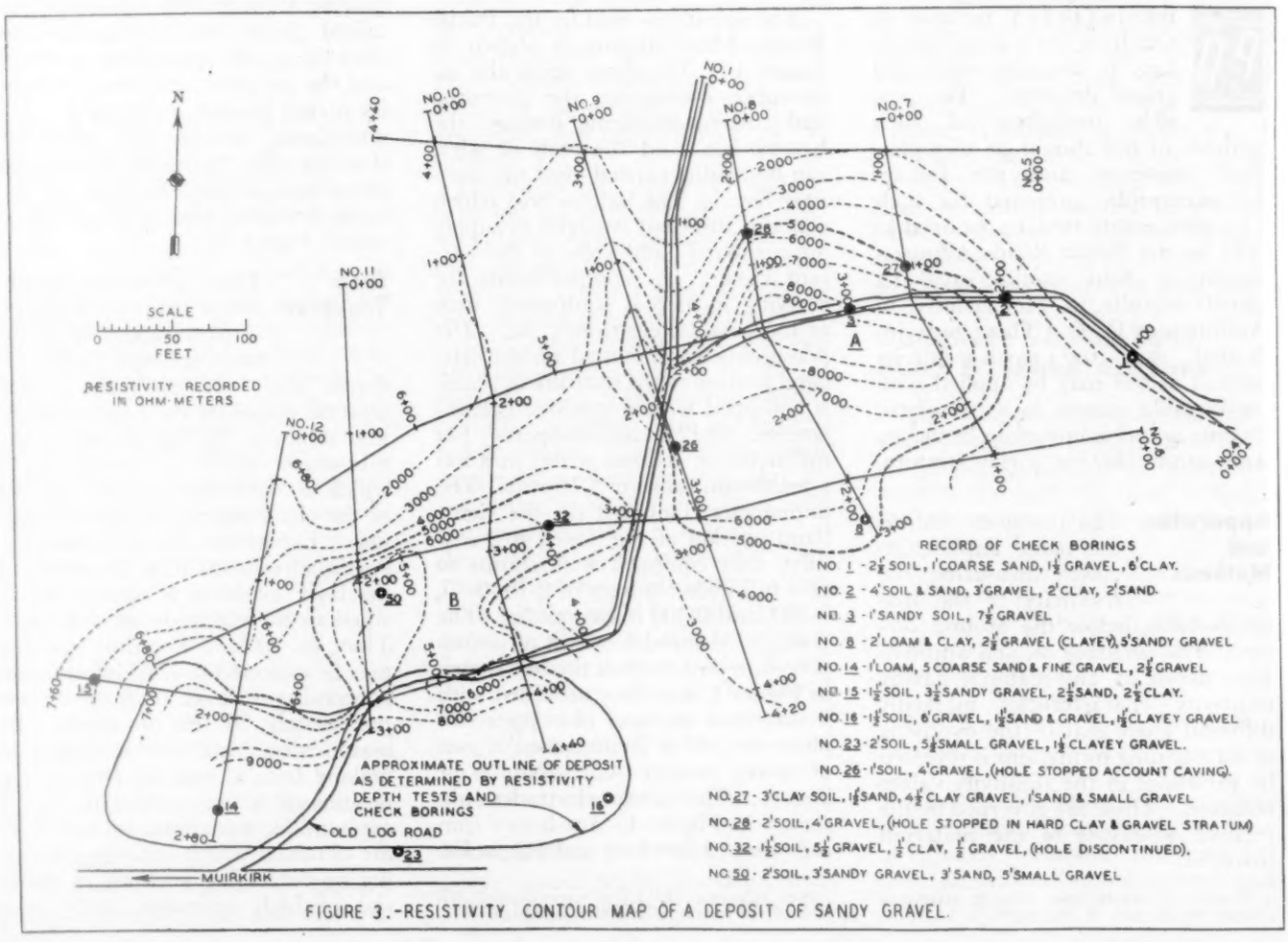

N
SCALE
0 50 100
FEET
RESISTIVITY RECORDED IN OHM-METERS
NO.1 0+00
NO.2 0+00
NO.3 0+00
NO.4 0+00
NO.5 0+00
NO.7 0+00
NO.8 0+00
NO.9 0+00
NO.10 0+00
NO.11 0+00
NO.12 0+00
A
B
APPROXIMATE OUTLINE OF DEPOSIT AS DETERMINED BY RESISTIVITY DEPTH TESTS AND CHECK BORINGS
OLD LOG ROAD
MUIRKIRK
RECORD OF CHECK BORINGS
NO. 1 - 2½' SOIL, 1' COARSE SAND, 1½' GRAVEL, 6' CLAY.
NO. 2 - 4' SOIL & SAND, 3' GRAVEL, 2' CLAY, 2' SAND.
NO. 3 - 1' SANDY SOIL, 7½' GRAVEL
NO. 8 - 2' LOAM & CLAY, 2½' GRAVEL (CLAYEY), 5' SANDY GRAVEL
NO. 14 - 1' LOAM, 5 COARSE SAND & FINE GRAVEL, 2½' GRAVEL
NO. 15 - 1½' SOIL, 3½' SANDY GRAVEL, 2½' SAND, 2½' CLAY.
NO. 16 - 1½' SOIL, 6' GRAVEL, 1½' SAND & GRAVEL, 1½' CLAYEY GRAVEL
NO. 23 - 2' SOIL, 5½' SMALL GRAVEL, 1½' CLAYEY GRAVEL.
NO. 26 - 1' SOIL, 4' GRAVEL, (HOLE STOPPED ACCOUNT CAVING).
NO. 27 - 3' CLAY SOIL, 1½' SAND, 4½' CLAY GRAVEL, 1' SAND & SMALL GRAVEL
NO. 28 - 2' SOIL, 4' GRAVEL, (HOLE STOPPED IN HARD CLAY & GRAVEL STRATUM)
NO. 32 - 1½' SOIL, 5½' GRAVEL, ½' CLAY, ½' GRAVEL, (HOLE DISCONTINUED).
NO. 50 - 2' SOIL, 3' SANDY GRAVEL, 3' SAND, 5' SMALL GRAVEL

FIGURE 3.-RESISTIVITY CONTOUR MAP OF A DEPOSIT OF SANDY GRAVEL.

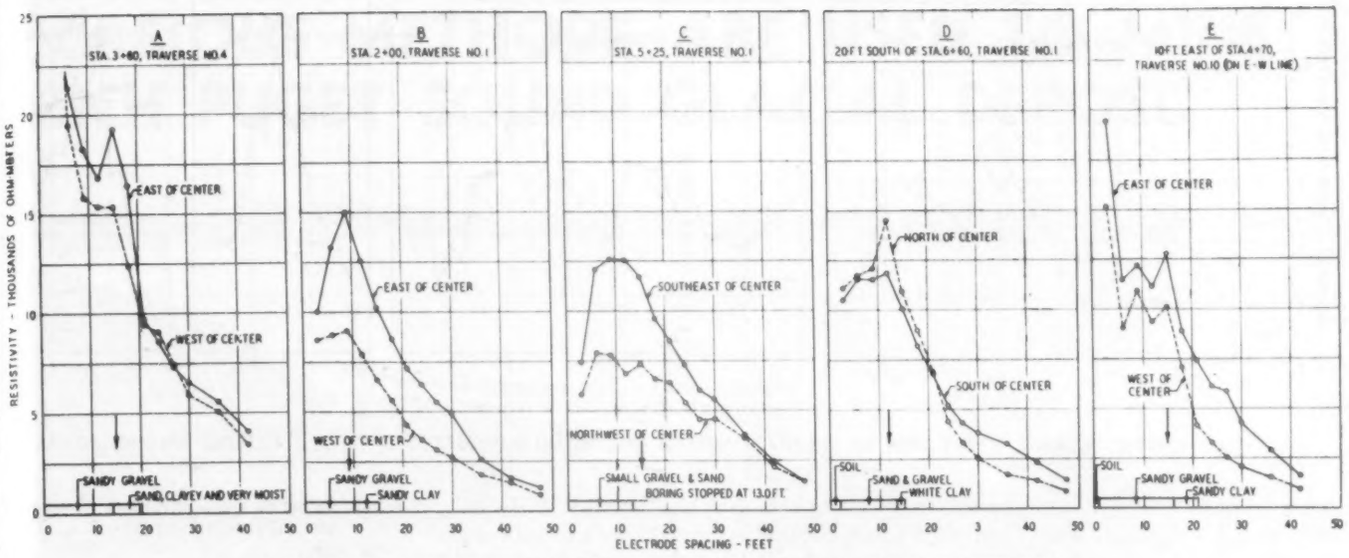


FIGURE 4 - RESISTIVITY DEPTH TESTS IN A SANDY GRAVEL FORMATION UNDERLAIN BY CLAY OR CLAYEY SAND.

the resistivity increases correspondingly. A common procedure in shallow exploration is to use an initial electrode spacing of 3 feet and subsequent spacings of 6 feet, 9 feet, 12 feet, etc. Each increase in the spacing of the electrodes probes approximately 3 feet deeper into the ground. The data are plotted with resistivity as ordinates and electrodes spacing as abscissas and any inflection in the resistivity curve indicates the depth at which there is a change in the character of the formation. A number of such depth curves are shown in Figure 4. In these tests there was a change from a gravel of high resistivity to clay or clayey sand with low resistivity. This change is indicated in the curves by the rather sharp decrease in resistivity at electrode spacings varying from 9 to 15 feet. In these tests the gravel lay within a few feet of the surface and the depth to the lower boundary of the gravel is indicated by the arrow appearing in each of the graphs. It is usually possible to pick top horizon of the gravel also when the depth of the overburden is of sufficient importance to warrant it.

Borings made at the locations of several of the depth tests showed that this method of test and analysis indicated the lower horizon of the gravel rather accurately. Under favorable conditions holes 20 to 30 feet in depth may be bored with only moderate difficulty with an ordinary 6-inch post-hole auger (see Figure 5). Two men may be expected to sink 4 or 5 holes to depths of 12 to 15 feet in an 8-hour day provided excessively hard cemented strata are not encountered. When making resistivity tests a crew of 4 men, consisting of an operator, a recorder, and laborers, can run about 2,000 to 4,000 feet of traverse per day and they may be expected to make from 20 to 30 depth tests involving depths of about 30 feet.

Trial Traverse

A trial traverse was laid out in the vicinity of Beltsville, Maryland, along an old logging road passing through an area where a gravel deposit was suspected. Tests were made at each 20-foot station along this line (traverse Number 1, Figure 3 and graph A, Figure 6). Two areas of high resistivity were located by this traverse. Another line of tests was run along another old road crossing the first traverse near station 2+00 where the first peak in the plotted graph occurs (traverse Number 4, Figure 3). A more positive indication of gravel was obtained in this second line of tests the results of which are plotted in Figure 2. Referring to this figure, it will be seen that the resistivities encountered, involving as they do a zone extending approximately 20 feet to the right and to the left of the line of tests and some 20 feet in depth, were comparatively low for the first eight test points. A test boring at station 1+00 showed successively 2½ feet of sandy soil, 1 foot of coarse sand, 1½ feet of wet gravel, 5 feet of blue clay, and 1 foot of a heavy white clay. Other borings and resistivity depth tests made along this traverse showed a gradually increasing amount of gravel to be present as the peak of resistivity shown between stations 1+60 and 5+00 was approached. Beyond station 5+80 the tests indicate that the material within 20 feet of the surface is largely clay. Graphs A and B in Figure 4 show comparisons of the results of borings with those of depth tests made at station 3+60 and at a point 10 feet south of station 4+20 (shown in graph B as station 2+00, traverse Number 1). The log of the boring is given in the lower left-hand corner of the graph. The close correlation between the resistivity depth-test data and the data from borings is characteristic of all the tests made in the immediate vicinity. Graphs C, D, and E show results for depth tests at other locations.

Fig. 5

Other traverse lines were run as shown in Figure 3, several of which are presented in Figure 6, and the resistivity map of Figure 3 was prepared. Referring to Figures 2 and 6, it is apparent that where one traverse crosses another there is usually similarity of the resistivity values obtained in the two separate test lines at their point of intersection. The plotted crosses indicate the values of resistivity obtained on the lines

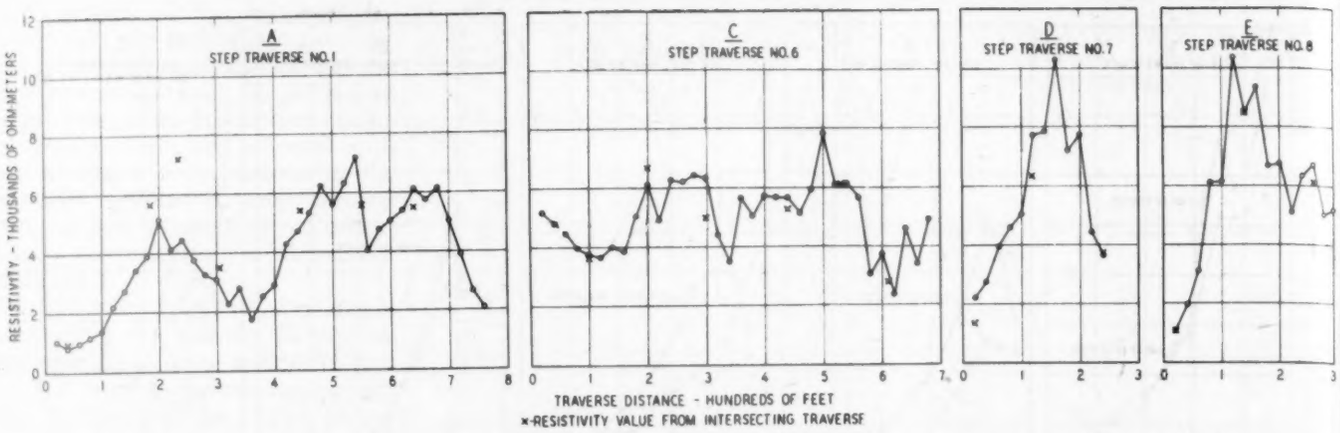


FIGURE 6.-EFFECT OF GRAVEL DEPOSIT UPON THE RESISTIVITY TRAVERSE (OR CONSTANT DEPTH TEST) DATA WITH ELECTRODE SPACING 20 FEET

that crossed the traverse shown in the graph. In only one case, that where traverse Number 9 crosses Number 1, is there any considerable difference between the resistivity values obtained. It is believed that the information obtained with the resistivity apparatus is dependable when properly interpreted. Referring to Figure 3, the various contour lines represent resistivity and the area of highest resistivity is found to coincide with the thickest part of the gravel deposit.

Resistivity depth tests and check borings both indicated that an area roughly bounded by the 5,000-ohm-meter contour contained a gravel stratum averaging 8 to 10 feet in thickness. The data indicated also that the gravel would be found within the first 12 feet of depth over much of the area and a working face of 15 to 20 feet giving a fair mixture of sand, gravel, and clay for use in low-cost road construction would be possible. The clay, for the most part, would be found in the lower 5 or 6 feet and in the form of clayey sand, sandy clay, or a comparatively pure clay.

An examination of the depth curves and the data from test borings in Figure 4 shows that the resistivity test data indicate the lower horizon of the gravel with a rather high degree of accuracy. The underlying material may vary from sand with some clay particles to a heavy clay stratum and because of its variable nature it is not so readily identified. Although a definite knowledge of the character of the underlying material may be of value, in some instances, a rough estimate of the quantities of gravel available is usually of greater importance. It appears that estimates may be made with considerable confidence when based upon resistivity data augmented by the results of a few test borings.

From the data obtained from the tests that have been described, it is estimated that the area marked "A" in Figure 3 should contain approximately 10,000 cubic yards of a sandy gravel with some clay and sand spots, all within about 15 feet of the surface. Area "B" is somewhat less uniform and should contain about 15,000 cubic yards of gravel.

Conclusions The resistivity method of exploration as used in this study offers a rapid and inexpensive means of locating and delineating gravel deposits that are underlain by clay. The most useful field for this method of test is in rapid reconnaissance surveys over relatively large areas where surface indications are few or unreliable. Routine subsurface tests along a projected highway location may be used to locate small local deposits of road-building material satisfactory for construction purposes, thus eliminating the expense of transporting materials from more distant sources.

Although the resistivity method has proved to be entirely satisfactory in many instances in the past, it should be emphasized that this method of tests is not always practical and that there are some field conditions under which resistivity tests will be of little value. A dry, loose overburden may possess such high resistivity as to completely mask the effect of sand, gravel, or rock in the deeper strata. Clay soils overlying or underlying clay-filled gravels may have resistivities so nearly the same as that of the gravel that it is difficult to interpret the resulting resistivity curves accurately.

In spite of these limitations, it is believed that the resistivity method of subsurface exploration has a definite field of usefulness in the solution of certain of the problems confronting the materials engineer as well as those met with by others on various civil engineering projects.

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[1]Wilcox (Stanley W.), Prospecting For Road Materials By Geophysics. *Engineering News Record,* February 21, 1935, page 271.

[2]Shepard (E. R.), Subsurface Exploration By Earth Resistivity And Seismic Methods. *Public Roads,* Vol. 16, No. 4, June, 1935, pages 57-67.

Eldorado Limestone Plans Expansion

Optimism concerning post-war employment has been expressed by several industrialists in the Sacramento valley area. J. H. Bell, president and general manager of the Eldorado Limestone Company, Shingle, California, stated that there are excellent possibilities for increased production of non-metallic minerals. His firm plans to expand its plant and personnel by 25 per cent.

Large Bauxite Deposits Await Development

According to a United States Bubeau of Mines report, millions of tons of bauxite ore are awaiting excavation in Pulaski and Saline counties in Arkansas. The fields, believed to be about 1,400 square miles in area, were discovered when government experts began searching for new bauxite deposits soon after Pearl Harbor.

A 50-ton-a-day pilot ore-dressing mill is under construction at Bauxite, where the Bureau of Mines will test the commercial feasibility of a Bureau process for concentrating low-grade ore for use in aluminum plants.

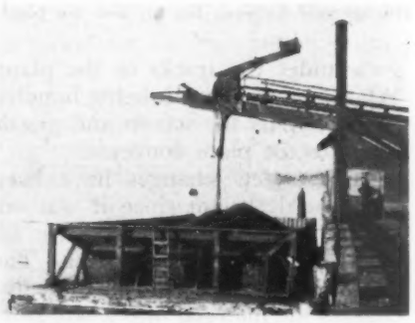
Colorado Fluorspar Corporation of Salida, Colorado, has been sold to Colorado Fluorspar Mines, Inc., a subsidiary of Sonoma Quicksilver Mines, Inc., of San Francisco. The purchase price was revealed to have been $300,000, with a down payment of $50,000. About 200,000 tons of ore, most of it assayed at 55 per cent. fluorspar, was found to be blocked out.

VARIOUS METHODS ARE USED TO MINE RICH PUGET SOUND GLACIAL DEPOSIT

General view of the Glacier Sand & Gravel Company's plant on Puget Sound near Steilacoom, Washington.

another ON THE SPOT report

THE Glacier Sand & Gravel Company's plant at Gravel Center, near Steilacoom, Washington, has a deposit most other producers would consider to be the answer to a prayer. This deposit is a terminal moraine about 350 feet thick with over 250 feet above high-tide level, of uniform composition, with very little oversize, and no organic matter, and with a 40 per cent. sand content. When this 100-t.p.h. plant and its deposit were described in the October 10, 1928, issue of PIT AND QUARRY, this was hailed as the ideal deposit. A later article in the January 1, 1930, issue described the improvements which increased the capacity of the plant to 300 tons per hour. No changes were then made in the method of recovery, but additional equipment was added in the pit. No important changes have since been made in the plant, but the pit has undergone many changes.



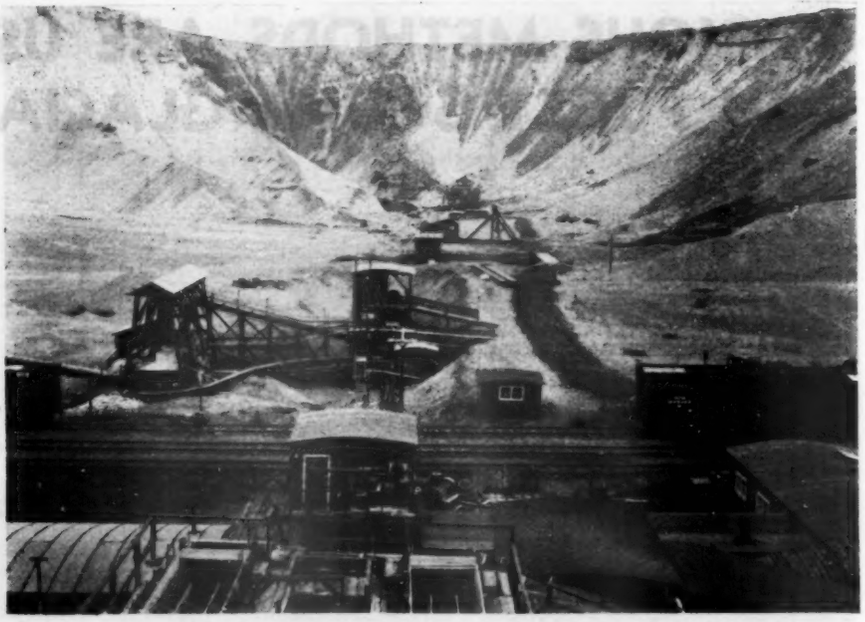
A 600-cubic-yard barge being loaded on the Sound.

Several years later, as the best-graded parts of the deposit were worked out and as the demand for finer materials increased in this area, the necessity for selective mining of the deposit developed. The original system consisted of a 4-cu. yd. drag scraper which discharged the material to a hopper over a 24-inch by 600-foot belt-conveyor which carried it through a tunnel under the main line railroad tracks to a grizzly at the plant. When the plant capacity was increased in 1930, this and the other 24-inch conveyors were increased to 42-inch width and a 2-cu. yd. drag scraper was added.

The first step toward selective mining was taken in 1936 when a tunnel was driven 350 feet into the 210-foot bank at right angles to the main pit conveyor. The aim was to recover some of the fine material in this part of the pit in order to balance the varying demand. Openings at 14-foot intervals controlled the discharge of material on a belt-conveyor which carried it out of the tunnel to the pit conveyor. Successive openings were used as this system worked back into the bank. By controlled use of the tunnel and the scrapers, the raw material could be roughly withdrawn as needed. This glory-hole system worked very well for a few years until the coarse sand in the tunnel area was worked out. Now the tunnel is used only when plaster sand is desired.

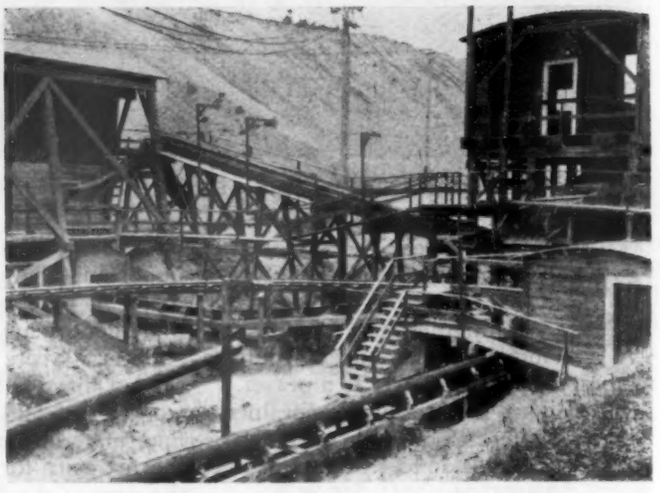
In the meantime the main pit conveyor had been extended gradually more than 600 feet as the pit was worked back into the deposit. Openings were made in the tunnel over this conveyor opposite selected sections of the pit where there are desired sizes of material, and scrapers were set up at these points to feed the material to the conveyor. As the pit was worked back on both sides of this conveyor, it became necessary to install tunnel conveyors at right angles to it, and the scrapers now feed to these. Several of these feeder

The hoist which operates the 2-cubic-yard scraper.



Above: Tunnel belt-conveyor which reclaims fine material through glory holes. Right: View of pit from plant, with scalping and crushing circuit in left foreground.

The storage system, with reclaiming tunnel at lower left.



Scalping and crushing arrangement between the pit and the plant.

conveyors are now 200 to 300 feet long. Usually three scrapers are used—a 3¾-cu. yd. Bagley which is operated by a Washington hoist, a 2-cu. yd. Bagley operated by a Clyde hoist, and a 2-cu. yd. Sauerman operated by a Smith-Watson hoist.

The amount of coarse gravel in the deposit increased as the pit was developed and it was decided early in 1937 to install a crushing circuit to be used when there was a demand for crushed gravel. The plant grizzly was moved to the pit side of the tracks and a Stephens-Adamson 1-deck screen was installed in conjunction with it. The coarse material passing over the screen plate goes on the 8-inch grizzly which diverts any large boulders from the crushing circuit. These drop into a small dump car and are carried to waste. This oversize material amounts to only a few tons annually. A 24-inch by 70-foot belt-conveyor now carries the oversize gravel to a Symons 4-foot cone crusher. The crushed gravel is carried on another 70-foot conveyor to the 350-foot main conveyor which goes under the tracks to the plant. When fine material is being handled it can bypass the screen and grizzly direct to the plant conveyor.

The 3¾-cubic-yard scraper, with hoist in background.

Only a few changes have been made in the plant since it was enlarged in 1930 and these have increased its flexibility of sizing. The under-track belt-conveyor now discharges the material into a box from which it is split to two sets of screens followed by sand-settling tanks. Four sizes of sand and any desired sizes of gravel are made. The finished products are discharged into individual bunkers with a combined capacity of 3,500 cu. yd. The various sizes can be reclaimed as desired on a 42-inch by 450-foot reversible belt-conveyor with a capacity of 1,000 cu. yd. per hour. In one direction this discharges into scows for shipment. In the other direction the material flows onto a 42-inch by 280-foot inclined belt-conveyor to the top of

(*Continued on page* 96)

Theory and Practice of Rotary Kiln Operation in the Manufacture Of Portland Cement

By "PORTLAND"

Part II

another P&Q exclusive

WE come now to the consideration of the composition of Portland cement clinker as made from limestone and clay. Neglecting all the unnecessary impurities that may be present, a typical clinker analysis might be as follows:

Lime	CaO	64.00%
Silica	SiO_2	21.00%
Alumina	Al_2O_3	6.25%
Ferric oxide	Fe_2O_3	3.25%
Magnesium oxide	MgO	2.75%
Sulphur trioxide	SO_3	1.75%
Loss		1.00%

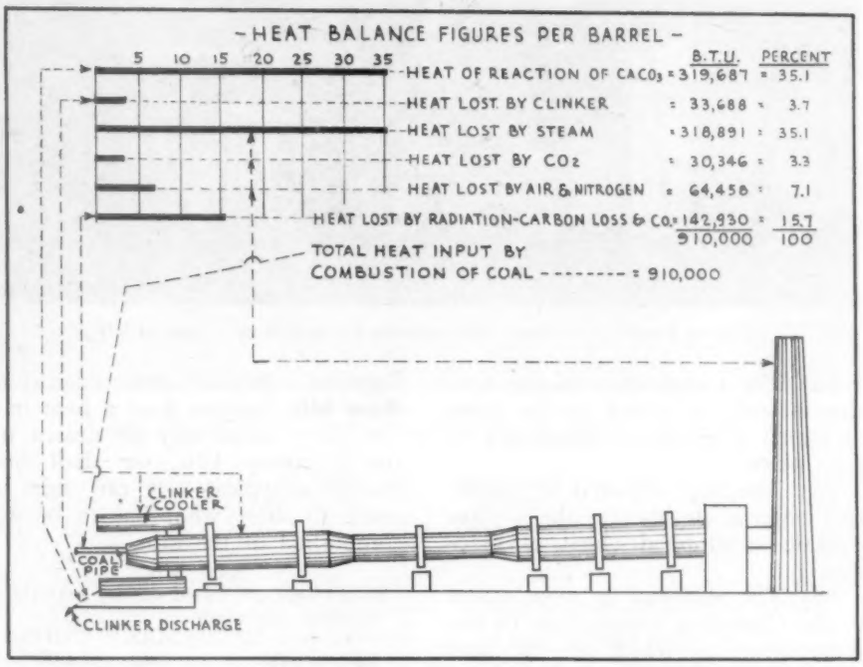
The manner in which these oxides combine to form cement clinker is rather complicated. The lime or calcium oxide combines with the other oxides to form the following compounds:

Dicalcium silicate ....2 CaO, SiO_2
Tricalcium aluminate.....
.....3 CaO, Al_2O_3
Tetra calcium alumina ferrite....
.....4 CaO, Al_2O_3, Fe_2O_3

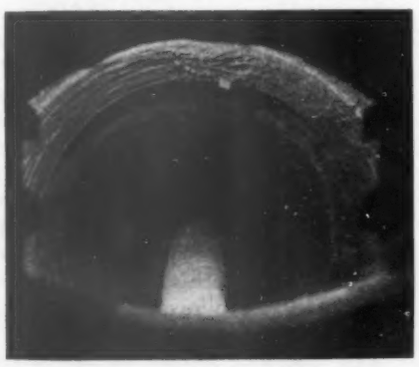
The lime (CaO) is derived from limestone which is calcium carbonate ($CaCO_3$). This carbonate is formed by the combination of calcium oxide (CaO) and carbon dioxide (CO_2). Thus, $CaO + CO_2 = CaCO_3$. The silica, alumina, and iron oxide are derived largely from the clay.

Since the materials used in the manufacture of cement are not fused or melted in the kiln, it is necessary in order to facilitate chemical combination that they be very finely divided and thoroughly mixed. When it is considered that the combinations are molecular in nature, it is easy to see how necessary it is that the particles be extremely minute, that the proportions be correct and constant, and that, as above stated, the mixing or blending be complete. Without attempting at this time to develop points for and against the wet and dry process it might be stated that the wet process is particularly well adapted to the proper proportioning and mixing of the materials, since they are handled in a semifluid state.

Wet-Process Kiln Operation In this discussion of rotary-kiln practice only wet-process kiln operation will be considered. The sole function of the rotary kiln is to apply heat to the raw material so that chemical combination between the various elements will take place. The creation of this heat in the kiln by the burning of fuel is one of the chief items in the cost of manufacturing cement clinker. Wherever heat is needed in any industrial work, it is desirable to use it with the maximum efficiency, so that the amount of fuel required may be reduced to the minimum. The cement industry is a very large consumer of fuel. The amount of coal burned per day in an average 2,000-barrel kiln is equivalent to that used in a modern steam power-plant supplying 8,000 horsepower per day.


-HEAT BALANCE FIGURES PER BARREL-
5 10 15 20 25 30 35
B.T.U. PERCENT
HEAT OF REACTION OF CACO3 = 319,687 = 35.1
HEAT LOST BY CLINKER = 33,688 = 3.7
HEAT LOST BY STEAM = 318,891 = 35.1
HEAT LOST BY CO2 = 30,346 = 3.3
HEAT LOST BY AIR & NITROGEN = 64,458 = 7.1
HEAT LOST BY RADIATION-CARBON LOSS & CO = 142,930 = 15.7
910,000 100
TOTAL HEAT INPUT BY COMBUSTION OF COAL -------- = 910,000
CLINKER COOLER
COAL PIPE
CLINKER DISCHARGE

A great deal has been done in recent years toward improving the thermal efficiency of the rotary kiln but, as will be shown later, there is still considerable room for improvement.



The discharge point of clinker from a 352-foot kiln to coolers attached to the shell.

The processing of the material in the kiln may be divided into three main divisions:

(1) Driving off the water or drying.

(2) Calcining, or driving off the carbon dioxide.

(3) Raising the heat of the material up to the clinkering temperature.

These three stages are not separated in the kiln by any clear line of division but merge into each other.

Work Done by Heat It is possible for the kiln designer to estimate the amount of heat required to produce a barrel of clinker. All the heat that is liberated in the kiln can be accounted for and this is called making a heat balance. The work done inside the kiln by the heat supplied is as follows:

(1) The slurry is heated from atmospheric temperature to 212 degrees F.

(2) The water in the slurry is vaporized or converted into steam.

(3) The steam is superheated and leaves the kiln at the temperature of the exit gas.

Control panel for two kilns, with recorder for optical pyrometer at left.

(4) The temperature of the now dry material is raised to the point at which calcination commences to take place.

(5) The heat required to calcine the material or liberate the carbon dioxide is supplied (heat of reaction).

(6) The material is next raised to the clinkering temperature or the temperature at which all the new chemical combinations take place. When this is reached, little, if any, additional heat is required, as these reactions are thought to be exothermic.

Types of Heat Losses Not all the heat that is liberated in the kiln does useful work. Heat is lost: (1) by being carried off by the exit gases, (2) by being carried off by the hot clinker, and (3) by radiation from the kiln shell.

Now the B.t.u. leaving the kiln in these three ways, plus the B.t.u. required in the kiln to supply the heat of formation and reaction for the compounds, and which is not again indicated by temperature, is equal to the B.t.u. liberated by the combustion of the fuel.

It may be pointed out that heat is required to raise the temperature of the air that is used for combustion to the temperature of the burning zone. However, this does not represent a complete loss, as very much of this heat is again given up while passing through the kiln. The actual loss that does take place from this source is largely represented by the temperature and weight of the exit gases. These gases are, of course, at a very much lower temperature than the burning zone. More will be said later as to the effect of excess air.

Typical Raw Mix Before attempting to illustrate how a heat balance may be drawn up for a rotary kiln, we shall first choose a typical wet raw mix in order to show what has to be accomplished in the kiln.

RAW MIX

(Percentages are based on dry material.)

Calcium carbonate	$CaCO_3$	75.00%
Silicon oxide	SiO_2	14.00%
Aluminum oxide plus iron oxide ..	$Al_2O_3 + Fe_2O_3$	6.25%
Magnesium carbonate	$MgCO_3$	2.25%
Loss other than CO_2....		2.50%
		100.00%

In addition to the above solids let us assume that the slurry contains 32 per cent. water.

The Canadian barrel of cement weighs 350 pounds and requires 350 pounds of clinker for its production, less the amount of gypsum that is added after burning. We shall, however, base our calculations on 350 pounds. To produce this 350 pounds of clinker about 550 pounds of raw material is required. This means that about 200 pounds is lost in processing in the kiln. Part of this is accounted for in dust loss, as a certain amount of the dried raw material is always carried up the stack with the exit gases. The chief loss in weight, however, is due to the disassociation or liberation of the carbon dioxide from the calcium carbonate and to converting the $CaCO_3$ to CaO, which is calcium oxide. Referring to the analysis above, we have 75 per cent. $CaCO_3$ and, converting this to weight, the CO_2 loss is as follows:

550 pounds of solids
75% $CaCO_3$ = 550 × .75 = 412.5 pounds of $CaCO_3$

$CaCO_3 - CO_2 = CaO$

From atomic weights we can determine the weight proportion of the calcium, carbon and oxygen in the 412.5 pounds of $CaCO_3$.

Atomic weight of Ca = 40
Atomic weight of C = 12
Atomic weight of O = 16

Proportionate weights will then be:

$CaCO_3 = 40 + 12 + (3 \times 16)$
$= 40, Ca + 12.C + 48.0$
total ..... = 100%

$CO_2 = 12 + (2 + 16)$
$= 12.C + 32.0$
total ..... = 44%

CaO 56%

This means, then, that every 100 pounds of $CaCO_3$ will produce 56 pounds of CaO and 44 pounds of CO_2. Since the CO_2 is a gas and leaves the kiln, the loss in weight from the $CaCO_3$ is then 44 per cent. The loss from 412.5 pounds will equal 412.5 × .44 or 181.5 pounds.

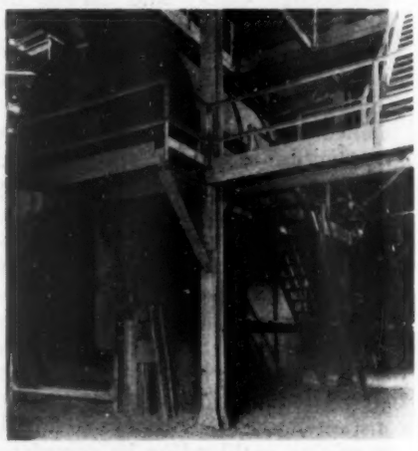
The weight of magnesium carbonate in the mix will be as follows:

2.5% $MgCo_3$ = 550 × 2.5 = 13.75 pounds of $MgCO_3$ or 7.18 pounds of CO_2 and 6.57 pounds of MgO.

The total CO_2 loss will equal 181.5 + 7.18 or 188.7 pounds.

Since we have a total loss of 200 pounds per barrel, there is still 11.3 pounds (200 — 188.7) to be accounted for by dust loss and from other volatile constituents of the raw material.

This sample slurry contains 32 per cent. water; therefore, the slurry is only 68 per cent. solids. 550 pounds which is the weight of solids, will then represent 68 per cent. of



Steel plate dust housing lined with 9-inch fire brick on 352-foot kiln.

the weight of the slurry required per barrel.

Weight of slurry per barrel will then be $\frac{550 \times 100}{68}$ = 809 pounds

Weight of solids.....	550 pounds
Weight of water (809 — 550)	259 pounds
	809 pounds

Heat Absorption and Loss Let us now make certain assumptions and then show the distribution of the heat absorption and heat loss in a typical wet-process kiln. Calculations will be made on the basis of one Canadian barrel of clinker produced or 350 pounds.

(1)	Kiln capacity per 24 hours	2,500 barrels
(2)	Dry coal used per barrel of clinker	70 pounds
(3)	Excess air used in burning	10%
(4)	B.t.u. of coal	13,000
(5)	Exit-gas temperature	450° F.
(6)	Exit clinker temperature	450° F.
(7)	Weight of dry material per barrel	550 pounds
8)	Percentage of $CaCo_3$ in mix	75%
(9)	Water content of slurry	32%
(10)	Specific heat of clinker	.25
(11)	Specific heat of air	.24
	Specific heat of CO_2	.20
	Specific heat of N	.24
	Specific heat of steam	.48
(12)	Heat of reaction of $CaCO_3$ per pound	775 B.t.u.
(13)	Latent heat of steam	970 B.t.u.
(14)	Temperature of air	65° F.
(15)	Total carbon content of coal	80%
(16)	Weight of air required per pound of coal	11 pounds

Heat Liberated by Combustion

70 pounds dry coal liberating 13,000 B.t.u. per pound = 70 × 13,000 = 910,000 B.t.u.

Heat Absorbed by Raw Material on Calcination (or Heat of Reaction)

Weight of $CaCO_3$ = .75 × 550 = 412.5 pounds.

412.5 × 775 = 319,687 B.t.u.

Heat Lost in Clinker Leaving Kiln

350 pounds clinker, specific heat = .25.

Temperature difference = (450 — 65) = 385° F.

Heat loss = 350 × 385 × .25 = 33,688 B.t.u.

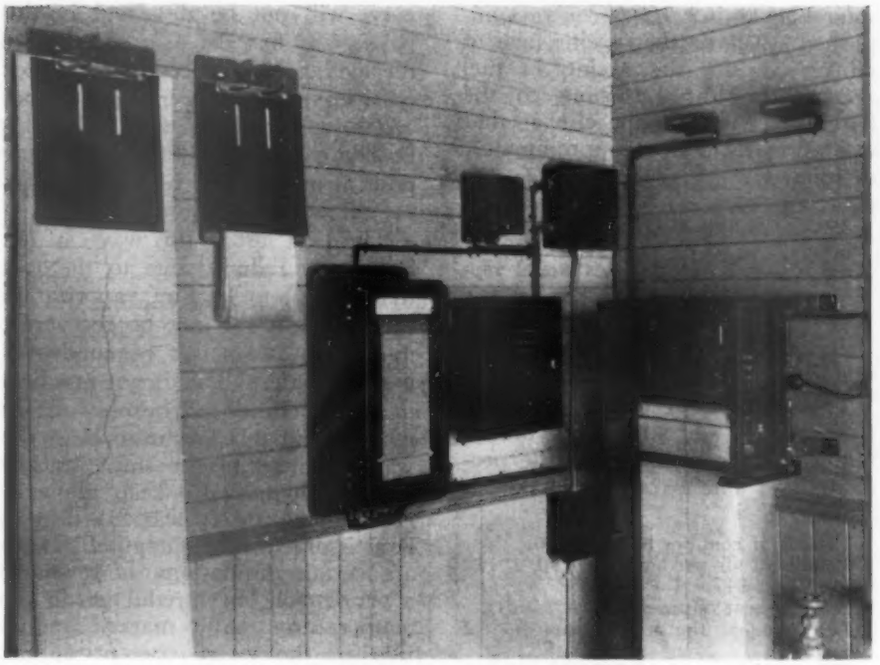
Heat Lost by Steam in Exit Gas

Weight of steam per barrel at 32% water in slurry = 259 pounds.

Heat required below 212° F. = (212 — 65) × 259 = 38,073 B.t.u.

Heat required for conversion to steam (see Item 13 above) = 259 × 970 = 251,230 B.t.u.

Heat required to superheat steam from 212° to 450° = 259 × (450 — 212) × .48 = 29,588 B.t.u.



Gas analyzer and rear end temperature recorder for long rotary kiln.

Total heat lost in steam = 38,073 + 251,230 + 29,588 = 318,891 B.t.u.

Heat Lost in Dry Gases

Neglecting the small amount of hydrogen and sulphur in the coal and considering only the total carbon, the weight of the products of combustion will be as follows (from Table III in Part I, July issue, page 73):

Total carbon = 70 × .80 = 56 pounds.

CO_2 — 56 × 3.667 = 205.4 pounds.

Total air plus 10% excess = (70 × 11) 1.10 = 847 pounds.

The weight of oxygen in 205.4 pounds CO_2 = 205.4 — 56 = 149.4 pounds or

$$C + O_2 = CO_2$$
$$12 + 32$$

Hence each 12 pounds of carbon requires 32 pounds of oxygen, and 56 pounds of carbon requires $\frac{56}{12} \times 32 = 149.4$ pounds of oxygen.

Deducting this 149.4 pounds of oxygen from 847. pounds of air, the net weight of free air and free nitrogen = 847 — 149.4 = 697.6 pounds CO_2 from mix (see above under Typical Raw Mix) = 188.7 pounds.

Then the total CO_2 = 205.4 + 188.7 = 394.1 pounds.

Air and Nitrogen = 697.6 pounds.

Heat loss from CO_2 = 394.1 × (450 — 65) .20 = 30,345.7 B.t.u.

Heat loss from air and free nitrogen = 697.6 × (450 — 65) .24 = 64,458.24 B.t.u.

Loss by Radiation

The loss by radiation will be equal to the difference between the heat liberated by combustion and the heat lost as accounted for above.

Complete Heat Balance

Total Heat Liberated = 910,000 B.t.u.

	B.t.u.	*Per Cent.*
Heat of reaction of $CaCO_3$	319,687	35.1
Heat lost by clinker	33,688	3.7
Heat lost by steam	318,891	35.1
Heat lost by CO_2	30,345.7	3.3
Heat lost by air and nitrogen	64,458.2	7.1
Heat lost by radiation, carbon and CO	142,930	15.7
	910,000	100.0

Total heat accounted for 910,000 B.t.u.

It will be seen from the above that all but 35.1 per cent. of the heat that is liberated in the kiln is lost. This may appear to be a very low efficiency, but there are a number of heat-consuming machines that have even lower efficiencies. The average steam locomotive, which is a heat engine, has an over-all efficiency of from only 8 to 10 per cent. Our largest and most modern steam central power stations have over-all efficiencies of not more than 25 to 29 per cent.

It will be observed that there are five chief sources of loss, and that the steam and radiation losses are by far the largest. Now it is difficult to reduce some of these losses, but any means adopted that will capture this waste heat and turn it back into the kiln will show a direct saving in fuel.

Let us consider the losses in order.

Heat Lost by Clinker Much has been done in recent years by the introduction of modern clinker coolers to extract heat from the clinker and return it to the kiln. This is done by utilizing the heat in the clinker to raise the temperature of the air that is required for combustion. When we consider that only a few years ago the clinker left the average kiln at about 2,000 degrees F. and that today the average temperature is about 450 degrees, it is evident that con-

siderable saving has been accomplished. Taking the specific heat of clinker as .25, the saving in fuel accomplished by returning to the kiln this heat from the clinker that was formerly lost is approximately as follows:

Heat in one barrel of clinker = $350 \times .25\ (2{,}000 - 450) = 133{,}625$ B.t.u.

With 14,000 B.t.u. coal this would represent a saving of

$$\frac{135{,}625}{14{,}000} = 9 \text{ pounds of coal per barrel.}$$

The temperature that this 135,625 B.t.u. would add to the air that is required for combustion in the production of one barrel of clinker is as follows:

Pounds of coal per barrel = 70.

Pounds of air per barrel = $(70 \times 11) + 10.\% = 847$.

Specific heat of air = .24

Let X equal the temperature rise of the air—

Then $(847X)\ .24 = 135{,}625$ B.t.u.

$$X = \frac{135{,}625}{847 \times .24} = 667 \text{ degrees F.}$$

These figures are only approximate for two reasons: (1) All the heat as represented by the drop in temperature of the clinker is not returned to the kiln as much of it is lost by radiation from the cooler, and (2) the saving in fuel obtained by preheating the air is cumulative, as the hotter the air, the less the fuel required, and the less the fuel burned, the less the air required.

It is a fact that, while we may not reclaim the amount of heat per barrel of clinker as shown, the weight of the coal and air required per barrel will also be less, so that it is reasonable to assume that the preheating of the air entering the kiln from the clinker coolers will amount to considerably more than 667 degrees F. A saving of 7 to 8 pounds of coal per barrel by the use of clinker coolers would be a conservative figure. This would equal about 2.4 cents per barrel with coal costing $6.00 per ton ground.

There are a number of mechanical difficulties in the way of reclaiming the remaining heat that is left in the clinker. As the temperature gets lower, the heat-reclaiming equipment increases in size and complication.

Heat Lost by Steam With the wet-process kiln the loss of heat by steam is serious and one of the first things that an advocate of the dry process will point out. This is a very important question and it becomes rather involved, as it leads to a discussion of the various points for and against the two processes. These points, however, will not be discussed in this paper. It may be assumed that in the average dry-process kiln the exit gases leave at a temperature of about 1,200 degrees F. and that unless this heat can be utilized for other purposes it may as well be used in driving off water from the slurry.

The heat lost in this way can not be greatly reduced due to the fact that the latent heat of vaporization in the steam can not be recovered, unless the steam can be condensed back to water. This is not practical in kiln operation. The only means of reducing this loss is to keep the water content of the slurry as low as possible and also keep the exit-gas temperature as near 212 degrees F. as is practical in operation. There are certain limitations, however, to a very much lower reduction in gas temperature. Any marked reduction in the water content of the slurry is also not possible for various mechanical reasons, the chief of which probably are that the slurry could not be pumped, and also that it could not be ground in the tube mills, as these mills would be liable to clog up when the slurry became too thick.

There is still another phase to this question of dry slurry. We could install filters and extract a large amount of the water mechanically. However, this would increase the cost of the installation, complicate operations, and result only in giving a higher exit gas temperature. Also, the dust-collecting property of the slurry-coated chains in the kiln would be affected. In a dry kiln the dust problem is very serious. The lower the water content of the slurry, the more nearly the wet-process kiln approaches a dry-process unit and, as stated previously, the exit gas temperature from the dry kiln is usually very high. The heat carried off by the steam in the wet unit is, then, to a large degree balanced by the heat loss as represented in the high-temperature dry gas of the dry kiln.

Waste-heat boilers could, of course, be installed in conjunction with filters and probably some type of dust-collecting system and thus a very high percentage of the heat from the waste gases might be reclaimed. The over-all economy of an installation of this kind would, however, have to be carefully calculated for any individual plant. It would be a question of determining whether or not the difference between the cost of purchased power and the cost of generated power would warrant the installation. In calculating the true cost of generated power all the capital charges of the installation and the increased cost of operation brought about by the extra equipment would have to be taken into account.

It must be admitted that to retain the wet process with all its many advantages and also reduce the heat loss as represented by the steam in the kiln gases is a difficult problem.

Heat Loss by CO_2 Heat loss by CO_2, air and nitrogen can be controlled, at least to a great extent. Anything that will reduce the weight of the exit gas and also lower the temperature will effect a saving. The weight of CO_2 driven off from the raw material can not be reduced, but a lowered exit temperature would reduce the heat loss from this source. It is clear that the minimum amount of excess air is desirable, as any air in excess of the minimum amount required only provides a medium for carrying off heat. This will cause an increase in the temperature of the exit gases, which is what might be expected, when we consider that the excess air has to be heated to the temperature of the burning zone, and that, since a certain temperature has to be maintained in the burning zone, more coal will be required. This highly heated air will then act as a medium for carrying additional heat through the kiln, with the result that the final exit temperature will be higher.

To show approximately the extent of the heat loss from excess air, let us assume in the kiln under consideration an additional 10 per cent. excess over the theoretical requirements. The heat loss per barrel will then be as follows (see above under Heat Absorption and Loss): Weight of excess air per barrel = $.10\ (70 \times 11) = 77$ pounds. Heat loss = $77\ (450—65)\ .24 = 7{,}115$ B.t.u. This is equal to approximately ½ pound of coal. This excess air percentage is based on weight, whereas the excess air as expressed in a gas analysis is based on volume. The two percentages are not the same but are close enough for comparison.

Now, while it is desirable to keep the amount of excess air as low as possible, we must not reduce it to the point where CO will appear in the exit gases, for in that event the B.t.u. loss would be much greater.

Let us assume there is 1 per cent. by volume of CO in the exit gases and make an approximate estimate of the heat loss on this account. The estimate will be on the basis of one barrel as before.

(*Continued on page* 93)

Crushed-Stone Directors' Conference at Cincinnati

another ON THE SPOT report

MEMBERS of the board of directors of the National Crushed Stone Association assembled at the Netherland Plaza Hotel, Cincinnati, on July 26 for their regular midyear meeting. President F. O. Earnshaw presided.

A. T. Goldbeck, engineering director, gave an oral summary of his written report on the activities of his department of the association since the presentation of his last previous report at the annual meeting in New York last winter. He described briefly a number of projects that have been carried on in the association's research laboratory.

One of these projects was a series of concrete investigations undertaken for a member company which produces ready-mixed concrete for the purpose of determining the most economical proportions of particular aggregates for the manufacture of a workable concrete.

Another project involved the making of comparative freezing-and-thawing tests on concretes made with both limestone and chert gravel in different combinations.

The effect of variations in the gradation of screenings combined with soft asphaltic cement on the durability of the resulting asphaltic concrete was the subject of another investigation.

A similar study was begun of five different gradations each with three asphalt contents in an effort to discover the reasons for the failure of a dense fine-graded bituminous-concrete pavement and is still in progress.

In issuing a specification for bituminous concrete requiring that at least 50 per cent. of the material passing the No. 10 sieve must be of a siliceous nature one of the states explained that this specification had been adopted for the reason that bituminous mixtures made with all-limestone aggregate are slippery. Tests made in the association's laboratory of five sections of pavement —one made with all-limestone aggregate, one made in accordance with the specification, and three others — showed all the pavements to be stable and durable. A device for measuring the anti-skid properties of these pavements was developed in the course of the investigation and tests made with it showed that the coefficient of friction of all the five sections was 0.6 at low speed.

In a study made for the purpose of improving the particle shape of stone sand it was found that a marked improvement in shape was obtained by the use of an impact type of crusher (in this case a Stedman) as compared with stone produced "in the normal manner". A similar improvement was noted when coarse aggregate was produced by the same type of crusher.

According to Mr. Goldbeck, the association's laboratory is now engaged in a study of the stability and durability of bituminous-concrete mixtures in an effort to develop simple tests for determining these qualities.

Numerous field studies were also made, one dealing with concrete failures associated with the use of calcium chloride, one with the failure of a bituminous-concrete road, and a third with the use of stone screenings as a base course in the bituminous shoulders of concrete runways.

Laboratory work in the field of bituminous mixtures appears to be urgently needed, said Mr. Goldbeck. An all-crushed-aggregate bituminous concrete, he said, would seem to have advantages because the angularity of the aggregate contributes to inherent stability and therefore a softer asphalt can be used. The softer asphalt requires a lower temperature for making the bituminous mix and therefore less hardening occurs during the mixing operation. This is conducive to longer life, because the pavement will remain plastic for a greater length of time when the asphalt is soft initially. Mr. Goldbeck added that, although these advantages are inherent in all all-crushed-aggregate bituminous concrete, numerical facts are needed to demonstrate them convincingly.

A brief report on his activities was presented by E. W. Bauman, the association's field engineer, who said that approximately half of his time had been spent in the field. Some of this work was done in response to requests from association members for help in solving specific problems. For the most part, he said, his work had dealt with specifications covering the maintenance and construction of highways and airports. Highway-department problems had arisen and been dealt with in eight states.

In his report to the board Administrative Director J. R. Boyd dealt at considerable length with the problems facing the industry because of war-time government regulations and of the changed conditions that would likely follow the termination of hostilities. Referring first to the control of the mining industry by the Mining Division of the War Production Board, Mr. Boyd said it is unlikely that any basic changes will be made in Order P-56 this year. He looks for a substantial improvement in the availability of certain types of production equipment in the last quarter of the year, particularly ½- and ¾-cubic-yard shovels and all but the largest tractors. No early relief is seen with respect to trucks and heavy-duty tires.

He reminded his audience of the fact that Order P-56 does not prevent a producer from purchasing capital equipment on an unrated basis and that, if needed equipment is available for delivery without a preference rating, it can be purchased without making application to the Mining Division for a preference rating. He pointed out also that the War Production Board's July announcement, that by December 31 of this year only military orders will carry preference ratings, means that civilian production will operate next year without production restrictions and without affirmative priority assistance.

Mr. Boyd cited as a reason for producers taking a more hopeful view of the man-power situation the fact that the War Manpower Commission has decentralized its authority to a substantial degree, leaving the extent to which controls should be continued largely to the judgment of the regional offices. He said it seemed reasonable to expect some early improvement in the manpower situation affecting crushed-stone producers because their operations are carried on to an increasing extent in other than Class I areas.

The recent ruling of Administrator Walling of the Wage-and-Hour Division by which coverage of the provisions of the Fair Labor Standards Act was broadened in their application to the crushed-stone industry was mentioned by Mr. Boyd, and he referred to the Gwynne Bill (H.R. 2788), then before the Judiciary Committee, as a means of providing relief from the incalculable danger in which producers find

themselves because of that ruling. The Gwynne Bill, if enacted, would require that all charges of alleged violation of the provisions of the Fair Labor Standards Act (popularly known as the Wage-and-Hour Law) be filed within one year.

Mr. Boyd pointed out that the outlook for the construction industry has been somewhat improved by the action of the W.P.B. in relaxing its control over construction activities. Order L-41 has been amended to allow drainage, ditch-digging, and other earth-moving operations to proceed without W.P.B. permission, if no lumber or other building materials (except drainage tile) are permanently installed. Order L-41-e, which deals with highway construction, allows the beginning of highway work which would be completed when material restrictions can be removed and permits grading, ditch-digging, and similar earth-moving operations, if no lumber or other building materials are permanently installed, except drainage pipe and culverts, including the head walls thereof. Culverts up to 20-foot span will be permitted without special authorization.

New construction for 1945 is expected to amount to approximately $4,400,000,000, Mr. Boyd said, and this figure, if realized, would represent a 12 per cent. increase over the volume in 1944.

Otho M. Graves reviewed the history of the formation of the Agricultural Limestone Division of the association and presented a brochure entitled *A Program for Advancing the Interests of Agricultural Limestone Products* with the subtitle *An Intelligent Plan, Practical and Now Functioning, Developed by a Representative Group of Producers for Effectively Promoting the Interests of All Those Engaged in the Production and Marketing of Agricultural Limestone.* The formation of a division within the structure of the National Crushed Stone Association required some changes in the by-laws by which the operation of this organization is regulated, and Mr. Graves presented the proposed changes for the board's consideration. The changes approved dealt principally with membership, voting power, board - of - directors membership, the designation of a member of the association's executive committee to serve *ex officio* on the board of directors and the executive committee of the Agricultural Limestone Division, and provisions for the formation of divisions and sections.

Membership in the National Crushed Stone Association now consists of three classes: active members, associate members, and Agricultural Limestone Division members. Any individual, firm or corporation producing crushed stone is eligible to become an active member, according to the by-laws now in effect, and it is also provided that "Agricultural Limestone Division members who are not also active members of the National Crushed Stone Association shall not be entitled to vote."

Section 1 of Article VIII provides that "The formation of Divisions of the Association composed of members closely allied as to interests may be authorized by the Board of Directors if and when in its judgment the welfare of such members would be more effectively served through the establishment of a Division."

Article IX, which deals with the Manufacturers' Division made up of associate members, has been amended to provide that any by-laws or amendments proposed for adoption by the division must, before becoming effective, be submitted to the association's board of directors or executive committee for review.

The organization of the Agricultural Limestone Division is provided for by Article X, which gives the division authority to adopt by-laws and amendments (subject to review by board and executive committee of the association), the power to elect its own chairman and other officers and to elect a board of directors and an executive committee, and the right to determine the basis of dues for its members and to control the expenditure of its funds.

On the recommendation of the Executive Committee the board decided to continue the employment of Mr. Bauman as field engineer after the expiration of the original two-year period on November 15, 1945.

With respect to the place and date of the next annual meeting the board decided that if it should be permissible to hold an annual meeting in 1946, it should be called for the week of January 26 and held at the Netherland Plaza Hotel, Cincinnati, but, if that should not be permitted, a board meeting should be held in New York City at the Hotel New Yorker.

With respect to the Walling ruling further discussion resulted in the decision to authorize the president of the association to appoint a committee of five members to study the ruling and to act in any way that appears to be in the best interest of the crushed-stone industry.

Mr. Boyd presented to the board a proposal to ask the Office of Price Administration to remove price control over the crushed-stone industry, and in support of it declared that, in his opinion, prices are not likely to run away as long as production exceeds the demand. He quoted Chester Bowles, director of the O.P.A. as having said that it would be his policy to remove price controls "commodity by commodity" and "industry by industry". Mr. Boyd offered for the board's consideration a letter requesting the removal of crushed stone from price control which he suggested be sent to Mr. Bowles. After thorough discussion the board instructed Mr. Boyd to dispatch the letter. In his proposed letter Mr. Boyd said that "at the present time the production of crushed stone from a record-breaking figure in 1942 has declined to new low levels, because of the obvious fact that construction for war was long ago completed" and that "very little construction can go forward at the present time under the restrictive provisions of L-41 and L-41-e of the War Production Board." He said, too, that "the public interest is wholly protected by normal competitive forces," yet the members of the industry are still required to function under MPR-188.

To widen the activities of the association and to spread the benefits that members of the association enjoy, the board authorized the president to appoint a committee of five members to develop and adopt a membership-promotion program.

Mr. Graves was designated by the board to serve as an *ex officio* member of the executive committee and board of directors of the Agricultural Limestone Division.

The board decided to authorize the appointment of a Technical Advisory Committee of 10 members with the power to appoint subcommittees on bituminous concrete, Portland cement concrete, and other products as the need for them becomes apparent.

Agstone Division Meets

The board of directors of the Agricultural Limestone Division of the National Crushed Stone Association met at the Netherland Plaza Hotel, Cincinnati, on July 27 with E .E. Haapala serving as chairman.

J. R. Boyd, secretary of the division, spoke of the government wartime controls that still are in effect and of the likelihood of their being relaxed or removed. His remarks on this and other similar subjects were largely a repetition of the comments he had made the day before to the board of the crushed-stone association.

As evidence of the interest shown

by agstone producers in the formation of the Agricultural Limestone Division Mr. Boyd pointed to the fact that 87 such producers had already become members of the division, which had been organized only a little more than three months prior to this board meeting.

The report of Henry A. Huschke, managing director of the division, dealt largely with the activities of Federal Reserve Banks in promoting the use of liming materials. He read from a letter which he had written one of the national farm journals and in which he told briefly what each of the banks he had visited had accomplished or planned to do.

In Cleveland the work of the Federal Reserve Bank has been confined to the financing of liming-material purchases. The bank is encouraging local bankers to make 5-year loans to farmers, these loans to be repaid by grain farmers in five equal annual payments and by livestock farmers in four equal installments beginning with the second year. Meetings have been held throughout Ohio and will be held this fall in western Pennsylvania, eastern Kentucky and some counties of West Virginia, thus completing coverage of the fourth Federal Reserve District.

Work in the seventh district which has headquarters in Chicago has included the distribution of copies of an article on soil depletion, addresses made to more than 100 meetings of local bankers on the subject of soil improvement, and the conduct of a two-day school on agriculture for groups of key bankers in 1943 and 1944. A handbook on soil conservation is now being prepared for distribution throughout the district.

The St. Louis Federal • Reserve Bank has developed a program for effective promotion of the farm-improvement idea in its district. Those in charge of the program believe that a plan should be drawn for each farm, laying out certain improvements to be made each year—terracing, gully control, seeding, fencing, liming, fertilizing and cover crops. The local banker lends the farmer each year the money needed to enable him to make the improvements scheduled for that year, and these loans are repaid as the increased income from the farm makes the money available. In the area around St. Joseph, Missouri, the banks have established a $500,000 credit pool to provide the money necessary for soil improvement and erosion control.

In the Kansas City and Dallas districts, according to Mr. Huschke, the Federal Reserve Banks have not yet progressed far enough to put programs into operation.

Otho M. Groves, *ex officio* member of the division's executive committee and board of directors through his designation as such by the National Crushed Stone Association's board the day before, presented the booklet, *A Program for Advancing the Interests of Agricultural Limestone Producers,* mentioned in the story of the association's board meeting, and proposed for adoption amendments to the by-laws of the division as published in that booklet. The changes were suggested for the purpose of bringing the by-laws of the division into accord with those of the association, and dealt with the division's right of self-government, its board of directors and its executive committee. For the purpose of obtaining a complete understanding of the meaning and effect of these proposals Mr. Graves explained how similar changes in the by-laws of the association had been approved by its board of directors in order to attain the objectives sought by the formation of the Agricultural Limestone Division. All the proposed changes were approved by the board.

In a poll of opinions as to the amount of agricultural limestone to be produced during 1945 there was disagreement based on local conditions. Southern producers thought this year's output would be less than that of 1944; some in the North Central (A.A.A.) Region thought it would be as great; others were of the opinion that it would be less. Excessive rain and the shortage of labor has adversely affected the sale of agricultural liming materials.

The division's board took the same action as the association's board with respect to the time and location of the 1946 annual or board meeting, selecting the Netherland Plaza at Cincinnati for the former if it should be held, and the Hotel New Yorker in New York for the latter if it should then still be necessary in the national interest to forbid the holding of large conventions.

The following members of the National Crushed Stone Association and its Agricultural Limestone Division and of their respective boards of directors and staffs, and guests attended both board meetings:

William M. Andrews

G. A. Austin

E. W. Bauman, National Crushed Stone Association, Washington, D. C.

L. J. Boxley

J. R. Boyd, National Crushed Stone Association and Agricultural Limestone Division, Washington, D. C.

F. O. Earnshaw, president, National Crushed Stone Association, Washington, D. C.

E. Eikel

A. T. Goldbeck, National Crushed Stone Association, Washington, D. C.

Otho M. Graves, General Crushed Stone Company, Easton, Pa.

E. E. Haapala

Henry A. Huschke, Agricultural Limestone Division, National Crushed Stone Association, Washington, D. C.

R. P. Immel

Charles Krause, Columbia Quarry Company, St. Louis

K. K. Kinsey

M. E. McLean

A. W. McThenia, Acme Limestone Co., Fort Spring, W. Va.

Floyd Mumma, Columbia Quarry Co., Decatur, Ill.

Paul M. Nauman, Dubuque Stone Products Co., Dubuque, Ia.

Norbert Neuheisel, Neuheisel Lime Works, Eau Claire, Wis.

Milo A. Nice

Stanley A. Phillips, PIT AND QUARRY, Chicago.

H. E. Rainer

Russell Rarey, Marble Cliff Quarries Co., Columbus, O.

Nathan C. Rockwood, *Rock Products,* Chicago.

A. B. Rodes, Franklin Limestone Co., Nashville, Tenn.

James Savage

F. W. Schmidt, Jr.

O. M. Stull

D. L. Williams

A. L. Worthen, New Haven Trap Rock Co., New Haven, Conn.

Agstone Plant Opened at Oklahoma Prison

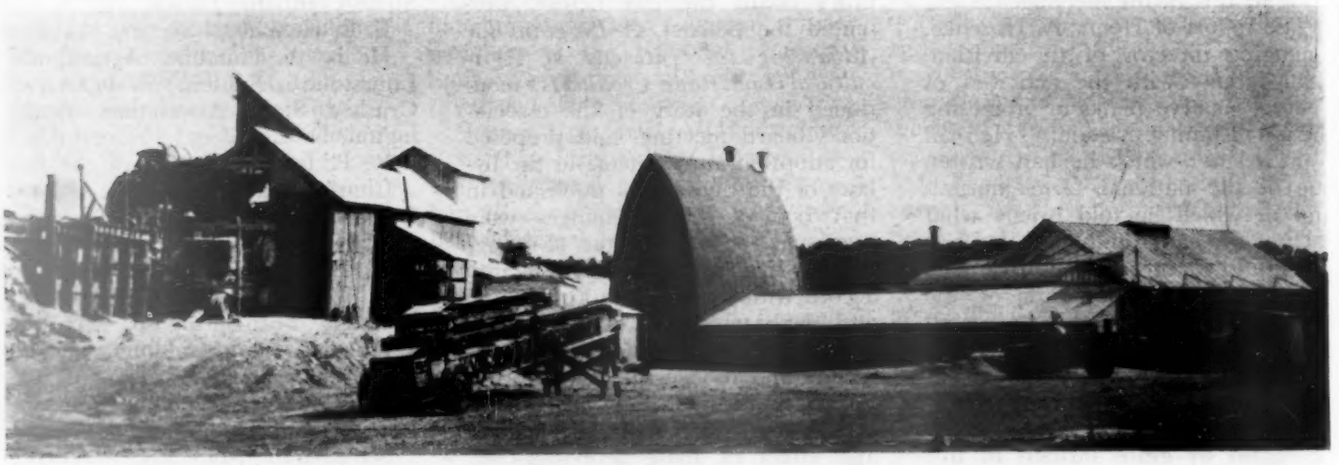
A plant to produce large quantities of high quality agricultural limestone at low prices for Oklahoma farmers was put into operation at the Stringtown, Oklahoma, subprison on August 1.

The plant is being operated as another of the prison industries which Governor Kerr said have, for the first time in history, placed the state penitentiary at McAlester on a self-supporting basis.

The new limestone plant will have a capacity of 75 tons an hour, or more than 20 carloads a day. Sales will be made only to farmers in Oklahoma on a cost basis. Arrangements have been made with the railroads to ship the limestone at a special reduced rate.

Applications may be made through county agents, and the cost of the limestone will be so low that farmers can easily purchase it with A.A.A. payments.

Wisconsin Plant's Capacity Doubled By Installation of New Equipment



General view of the A. Overgaard quarry and agstone plant at Elroy, Wisconsin.

another ON THE SPOT report

IN THE October, 1942, issue of PIT AND QUARRY was published a description of the operations of A. Overgaard of Cambridge, Wisconsin, one of the most progressive producers of agricultural limestone and crushed stone yet encountered by the writer. At that time Mr. Overgaard operated a quarry near Elroy, where he had a portable crushing and screening plant and a new fine pulverizing plant. He also operated two portable plants to supply road stone in various parts of the state. Since this article was published, the Elroy crushing plant has been converted into a permanent setup, the grinding plant has been improved and one new large-capacity portable plant has been added, along with other equipment.

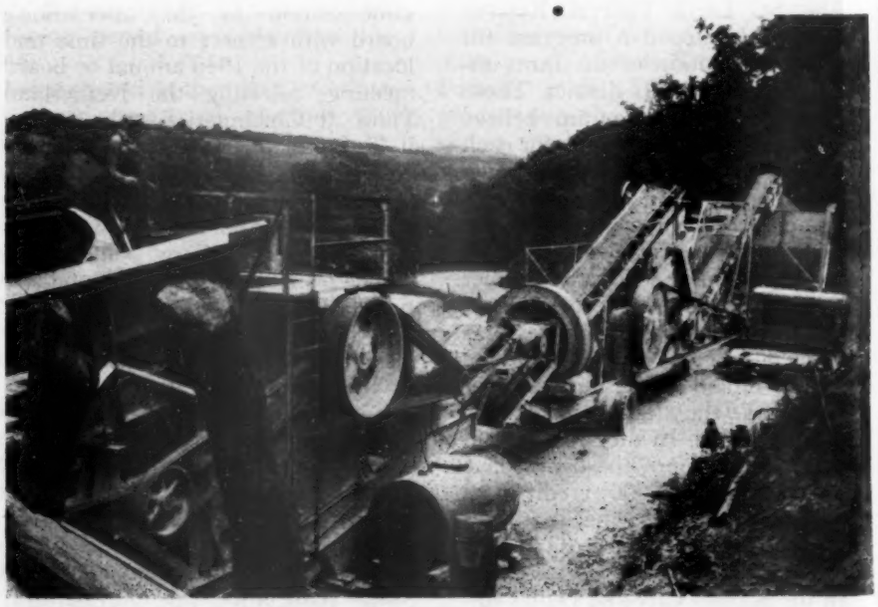
This 4- by 10-foot, 2-deck screen in the Elroy plant has rubber balls between decks to prevent blinding.

The quarry at Elroy has been enlarged but is otherwise unchanged since last described. Like most limestone deposits in this area this one is a limestone cap overlying sandstone. These are found only on the highest hills. The truck haul to the plant is now ¼ mile one way.

By W. E. TRAUFFER

At the plant a short belt-conveyor was installed between the 18- by 36-inch Universal jaw primary crusher and the main belt conveyor. This discharges the stone into a 6-cubic-yard surge hopper which evens out the feed of material to the screen. The original 3- by 8-foot screen has been replaced by a 4- by 10-foot Simplicity 2-deck screen which has a 1-inch top deck and a 1/10- by 7/16-inch bottom deck. The bottom deck of the screen has rubber balls under it which keep the openings clear. The oversize now goes to a new Gruendler 5x6 reversible hammer-mill and is returned to the main conveyor, for rescreening. The hammer-mill is driven by a Caterpillar D17,000 engine and is reversed to even out hammer wear by twisting its flat belt drive.

The material over the bottom deck of this screen drops into a bin as road stone. That through the bottom deck is finished agstone and this goes to another bin.



The large portable crushing and screening plant. The Diesel engine at the left drives the crushing section; the one in the background, the screening section.

A new hammer-mill which has doubled the capacity of the Elroy plant.

These improvements have more than doubled the capacity of this plant, which now makes from 425 to 450 tons of agstone and over 225 tons of road stone in a 10-hour day. The agstone far exceeds the specifications both in quality and in fineness. Its fineness averages 95 to 96 per cent. through 8-mesh, 57 to 60 per cent. through 20-mesh, and 44 to 47 per cent. through 100-mesh. All shipments from this plant are weighed on a Winslow truck scale. Stockpiled stone is reclaimed by a Barber-Greene loader.

The fine-grinding plant has been improved by the installation of a Caterpillar D13,000 engine which replaced the smaller original engine. This drives the entire plant including the Raymond No. 5,047 high-side, 4-roller kiln mill, and its exhaust and vent fans. The St. Regis 2-tube bag packer its powered by a 10-horsepower electric motor. The shortage of paper bags has been temporarily overcome by the use of bags purchased from the defunct Vulcanite Portland Cement Co. The new engine was largely responsible for increasing the plant's original 5-ton capacity to 7 tons per hour.

This plant makes a specially fine product which is sold for several purposes. Much of it is sold on assignment, but many farmers buy it outright in order to get quick results on their soil. It is also sold to feed dealers and to large feed manufacturers serving Iowa, Minnesota and Wisconsin.

This product sold slowly at first, but its advantages have steadily increased the demand. It is rated very highly on mineral content by the College of Agriculture of the University of Wisconsin which tested it as follows:

99.5	per cent.	through	100-mesh
93.0	"	"	200-mesh
76.0	"	"	300-mesh
98.5	"	$CaCO_3$	equivalent
29.6	"	CaO	
20.32	"	MgO	

The company has A.A.A. contracts for 26,000 tons of agstone for Juneau County alone—the county in which these plants are located. Contracts for the neighboring Vernon, Sauk, Richland and Monroe Counties total an additional 30,000 tons. The contractor who does most of the hauling also has a 15,000-ton contract for Adams County.

The two Universal portable plants owned by the company late in 1944 finished a contract for 49,000 tons of stone for black-topping State Highway No. 33 near Cashton, Wisconsin. This large plant is now near La Crosse, where it is producing part of a 120,000-cubic yard contract for runways for the La Crosse Airport.

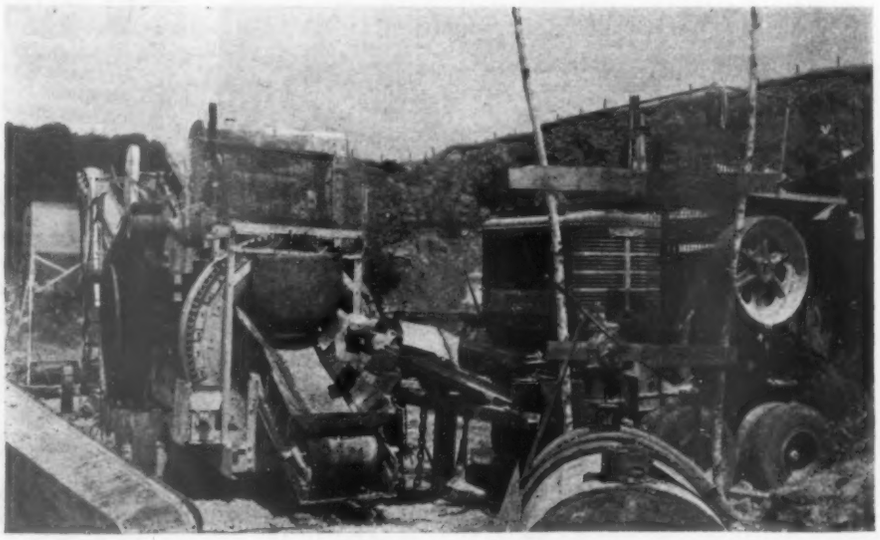
The engine which drives the new hammer-mill.

When visited by the writer, this plant was located on Highway 33 about 6 miles east of Middle Ridge. Drilling was done by a Cleveland wagon drill for which air was supplied by a mobile Ingersoll-Rand compressor driven by a Waukesha-Hesselman engine. The stone was being loaded by a pilot model Koehring Model 605 shovel with a 1½-cubic-yard dipper and a Caterpillar D13,000 Diesel engine. Sterling dump trucks carried the stone to the feed hopper of the Universal portable plant. The slat feeder, the 30- by 42-inch jaw primary crusher and a short conveyor are all on one chassis with 12 pneumatic tires and are all driven by a Murphy Diesel engine.

Material being loaded into a truck by a 1½-cubic-yard pilot model shovel at the larger portable plant's quarry.

On a second chassis on four hard-tired wheels is a Simplicity 4- by 8-foot 2-deck screen from which the oversize drops into a 40-inch roll crusher where a wheel elevator feeds the stone back onto the screen. The product of the screen drops on a short belt-conveyor. A long boom belt conveyor, supported at one end on two pneumatic-tired wheels, discharges the finished stone into a truck-loading bin. All this equip-

(*Continued on page* 96)



Smaller portable plant with jaw crusher and engine at right. Screening section with Diesel engine at left.

Mexican Cement Industry's Exhibits Foretell Great Increase in Production

another P-Q exclusive

UNDER the patronage of dynamic Governor of the Federal District of Mexico, Señor Lic. Javier Rojo Gómez, a National Exhibition on City Planning and Construction was held recently at Mexico City's beautiful Palace of Fine Arts. The exhibition concerned mainly city planning—and municipal services, dwellings, schools, hospitals—markets, water supply and sewers, paving, lighting, etc.

Important exhibits were also presented by the following Government Departments:

Public Works and Communications, which had a large exhibit with models, maps, pictures, graphs, and movies of the important work they have been doing on construction of highways, railroads, bridges and buildings.

Irrigation, which is working on the construction of many dams and projects throughout the country, so that at the end of President Avila Camacho's term, Mexico will have 2½ million acres of land under irrigation. This will be a great help in a country where most of the cultivable land is in arid or semi-arid locations. The exhibit of this department not only showed by maps, models and graphs the excellent work it is doing, but also presented an exhibition of the history of irrigation in Mexico, since Aztec King Netzahualcoyotl, (years 1402 to 1470 A.D.), who was the first engineer in America to built hydraulic structures to improve land cultivation.

Other exhibitors were the Federal Power Commission which is working to double Mexico's power facilities and the Department of War which exhibited models of new quarters and hospitals. The construction materials industry was represented by many exhibits, one of them showing Mexico's increase in cement production which will be tripled in a 3-year period, (see PIT AND QUARRY, issue of July, 1945).

Natural stone manufacturers built a nice stand, too, showing lathed marble columns and cut stone in the great many colors and varieties of volcanic rocks that are so abundant in the country, and beautiful Mexican onyxes and marbles of various shades.

During the whole term of the exhibition, June 18 to July 3, three daily lectures were given in the Palace room of lectures. Lecturers were the country's most prominent architects and engineers, leading professors on such important subjects as city planning, dwellings, markets, technological centers, materials of construction, soil mechanics and

DESARROLLO DE LA INDUSTRIA MEXICANA DEL CEMENTO
CEMENTO TOLTECA
PROCESO GENERAL DE MANUFACTURA DEL CEMENTO PORTLAND

Exhibit of the Mexican cement industry, indicating the increase over a three-year period.

TOLTECA, Hgo.
LAGUNA, Oax.
APASCO
TOLTECA
EN 1944, LA EDIFICACION PRIVADA EJECUTADA EN EL DISTRITO FEDERAL REPRESENTO UNA INVERSION DE 159 MILLONES DE PESOS, DE LOS CUALES 7.- SEA UN 4.4% CORRESPONDEN AL COSTO DEL CEMENTO EMPLEADO. EL MARAVILLOSO POLVO REPRESENTA PUES, UNA FRACCION MUY REDUCIDA DENTRO DEL COSTO DE LA CONSTRUCCION.
APLICACIONES del CEMENTO
DOSIFICACION del CONCRETO

Another display of the cement industry showed photographs of new plants and additions.

President Sr. Gral. Don Manuel Avila Camacho, a visitor at the exhibition, inspects the charts of the National Laboratories.

foundations which present a very special problem for the poor subsoil that underlies Mexico City.

High officials of the Mexican Government like the Minister of Economy, Ing. Gustavo P. Serrano, and the Commissioner of Irrigation, Ing. Adolfo Orive Alba, partook in the lectures. Señor Serrano explained the essential plans for Mexico's industrialization, and Señor Orive the irrigation policy of the government. Mexico, said Señor Serrano, has entered a new era of industrial development that the government will promote by providing the basic elements and conveniences, and stimulating private enterprise.

Señor Orive finished his exposition by comparing the efforts of peaceful and democratic countries that work for the conquest of new land, not by bloody wars, but by engineering the reclamation of their own deserts.

In regard to materials of construction, Señor Ing. Federico Barona de la O., gave lectures on the efficiency and savings in cost that can be obtained in construction, through the use of materials of good quality, properly controlled in testing laboratories and wisely used through well conducted research. The Commission of Irrigation of Mexico, he said, has saved many millions of pesos in the development of different projects, by using cement and concrete of special properties suitable to the type of construction to be done.

The City of Mexico could also save and continue its program of concrete paving through the present scarcity of steel, by previous research made since 1939, when experimental unreinforced pavement sections were built with uniform thickness of concrete and contraction joints of weakened-plane type spaced 20 feet apart.

Theory *(from page 86)*

Total CO_2 = 394 pounds
Air and nitrogen = 698 pounds
Cubic feet per pound of CO_2 at 62° F. = 8.6
Cubic feet per pound of air at 62° F. = 13
Volume of CO_2 = 394 × 8.6 = 3,388 cubic feet
Volume of air and nitrogen = 698 × 13 = 9,074 cubic feet
Total volume of gases per barrel at 62° F. = 12,462 cubic feet
Assume 1 per cent. of this amount to be CO = .01 × 12,462 = 124 cubic feet
Weight of 1 cubic foot of CO = .0734 pounds
Weight of 124 cubic feet = .0734 × 124 = 9 pounds

As 2.33 pounds is the weight of CO liberated from the combustion of 1 lb. of carbon and the loss in heat per pound of carbon when it is burned to CO instead of CO_2 is 10,310 B.t.u., 1 per cent. CO in the exit gases, which is equivalent to 9 pounds CO per barrel of clinker produced, will represent a heat loss of approximately $\frac{9}{2.33} \times 10{,}300 =$ 39,800 B.t.u., or, in terms of coal $= \frac{39{,}800}{13{,}000} = 3$ pounds.

From this it can be seen that the fuel loss is much more serious when the kiln is operated with such a deficiency of air that some of the coal can only burn to CO, than if it were operated with an equal percentage of excess air. In fact the loss is so great that every precaution should be taken at all times to prevent CO from appearing in the exhaust gases.

Loss by Radiation In one of our 400-foot kilns there is over 12,000 square feet of radiating surface on the kiln shell, and with the multicylinder cooler there are many more square feet of surface to radiate heat. Very much of the kiln has been insulated, but unfortunately it does not appear practicable to insulate the shell in the vicinity of the burning zone. This is where the heavy heat loss takes place on account of the high difference in temperature between the shell and the atmosphere. There are two chief reasons why insulation can not be placed between the brick lining and the kiln shell at this point. The first is that any available insulating material will not stand the crushing stresses set up by the hot brick lining and also the insulating material will lose structural strength under high heat. The second reason is that the brick refractories commonly in use would not stand the increase in temperature to which they would be subjected when the radiation was restricted. It would not be permissible to place insulation on the outside of the kiln shell at the burning zone, for in this case the shell plating would very rapidly become overheated, and, also, it would not be possible to detect thin lining by noting hot spots on the shell, if it were covered.

Carbon Loss This is due to coarse coal. When the coal is not pulverized sufficiently fine, many of the coarse particles do not burn in suspension, but fall into the clinker. They probably burn completely, but the heat is wasted since most of the clinker is already formed. This loss is difficult to estimate but it might be very appreciable, depending on the percentage of coarse particles in the coal.

(To be continued)

AVERAGE HOURLY WAGES IN THE OHIO LIMESTONE INDUSTRY

By LOUISE SIGLER
Associate Labor Economist, U. S. Bureau of Labor Statistics

another P&Q exclusive

A SURVEY of occupational wage rates conducted by the Cleveland Regional Office of the Bureau of Labor Statistics provides information on straight-time average hourly earnings of workers in selected occupations in the limestone and related products industry in the northwestern Ohio area, as of October, 1944. The data were obtained by experienced field representatives of the Bureau from pay rolls and other company records. A standard set of job definitions was used in order to insure uniformity in the classification of workers in each establishment.

The wage data were made available to the National War Labor Board and its appropriate Regional Board for use in the establishment or revision of wage-rate brackets under the wage-stabilization program. Wage brackets are determined by representatives of employers, workers, and the public on the basis of all wage information available. Normally, the minimum bracket rates established by the board are lower than the average rates, and are generally based on rates effective approximately as of April, 1943.

The 37 plants included in the study are located in 18 counties in the northwestern section of the State of Ohio, where there is a concentration of limestone operations. The employment in these plants is believed to represent approximately 90 per cent. of the total in the industry in plants having 9 or more workers each in this area. The products manufactured by these plants are agricultural lime and limestone, limestone flux, road construction and maintenance limestone, quicklime, hydrated lime, refractory dolomite, and other crushed-limestone products. Cement plants, which usually quarry their own limestone, were excluded from the survey.

The 37 plants had a total of 2,470 workers when the survey was made. Thirteen plants with a total employment of 1,921 had in excess of 50

AVERAGE HOURLY EARNINGS[1] OF MALE WORKERS IN SELECTED OCCUPATIONS, LIMESTONE AND RELATED PRODUCTS, NORTHWESTERN OHIO, OCTOBER 1944—PART I

Occupation and Class	Number of Establishments	Number of Workers	Straight-Time Hourly Earnings				
			General Average	Lowest Establishment Average	Highest Establishment Average	Union Establishment Average	Nonunion Establishment Average
Ashmen	5	8	$0.71	$0.70	$0.73	$0.71	(3)
Baggers	11	36	.93	.65	1.47	.88	(3)
Bin men	14	36	.73	.50	.79	.73	$0.71
Blacksmiths, maintenance	11	14	.92	.80	1.04	.94	.89
Blasters	16	19	.80	.61	.99	.83	.69
Blasters' helpers	5	6	.78	.74	.86	.78	(3)
Brakemen, locomotive	2	19	.67	(2)	(2)	(3)	(3)
Bricklayers, refractory brick, class A	4	4	1.15	.98	1.60	1.19	(3)
Bricklayers, refractory brick, class B	3	3	.80	(2)	(2)	.80	.....
Bulk-lime loaders	6	23	.75	.70	.82	.75	(3)
Cable hookers	16	21	.69	.50	.78	.71	.65
Carpenters, maintenance, class A	4	6	.97	.91	.99	(3)	.95
"Caterpillar" operators	5	13	.90	.75	.96	.93	(3)
Cleaners, car	5	15	.69	.50	.78	.74	(3)
Coal handlers	6	13	.72	.70	.82	.72	.....
Common laborers	29	233	.69	.50	.78	.70	.66
Conveyor tenders	3	9	.75	.72	.78	.75	.....
Cooler men	4	46	.83	.73	.86	.83	.....
Crane engineers	22	46	.91	.67	1.01	.91	.89
Crusher feeders	11	19	.69	.50	.78	.73	.66
Crusher operators, primary	14	17	.77	.50	.92	.81	.72
Crusher operators, secondary	12	16	.76	.50	.90	.82	.69
Drawmen, burned lime	10	62	.73	.65	.82	.73	.72
Drillers, primary	30	102	.76	.50	.87	.75	.78
Drillers, secondary	17	39	.76	.50	.89	.78	.71
Dryer operators	3	14	.73	.72	.74	.73	.....
Dump men, kilns	9	16	.73	.65	.79	.73	.74
Electricians, maintenance, class A	8	19	1.02	.87	1.58	1.04	(3)
Electricians, maintenance, class B	7	12	.85	.78	1.02	.85	(3)
Engineers, stationary, class I and II	3	6	.95	.94	.98	.95	.....
Firemen, crane and locomotive	14	38	.73	.69	.80	.72	.78
Firemen, stationary-boiler	8	23	.81	.76	.87	.81	(3)
Gas-producer operators	2	8	.80	(2)	(2)	(3)	(3)
Helpers, jouneyman	11	39	.75	.50	.86	.77	.63
Hoist men	23	35	.75	.50	.86	.76	.73
Hydrators	10	17	.77	.72	.86	.77	(3)
Janitors	8	18	.72	.60	.78	.74	.68
Lime burners	12	138	.81	.65	1.08	.81	.81

[1]Exclusive of premium payments for overtime and night-shift work.
[2]Low and high averages not shown to avoid the identification of individual establishments.
[3]Too few plants and, or, workers to justify the presentation of an average.

workers each, the employment in the 4 largest plants ranging from 192 to 415 workers. Twenty-four plants had from 9 to 50 workers each, with a total employment of 549.

Twenty-three of the 37 plants were unionized; 12 had collective-bargaining agreements with A. F. of L., 8 with C. I. O. and 3 with independent unions. Twelve of the unionized plants were in the 9- to 50-worker size group and 11 employed more than 50 workers each. The total employment in the unionized plants was 1,935 as compared with 535 workers in the 14 nonunionized plants.

Work Weeks and Overtime

The scheduled work weeks and overtime reported by the 37 plants, all of which employed male workers only in the selected occupations, ranged from 40 to 64 hours. Sixteen plants had a work schedule of 48 hours a week and 12 had a 54-hour work week. Six of the other 9 plants reported work weeks ranging from 55 to 64 hours, while the 3 remaining plants worked 40, 44, and 52 hours a week.

Thirty-four of the plants reported the payment of time and one-half for work in excess of 40 hours a week, and 26 plants paid this premium rate for work performed after 8 hours in one day. Five plants reported provisions for the payment of time and one-half for work on the sixth consecutive day in a given week and 16 plants provided for double-time pay for work on the seventh consecutive day. Twenty-three plants reported the payment of time and one-half for work on holidays and one plant paid double-time for such work.

Twenty-five of the 37 plants reported having second-shift operations and 14 of them also operated third shifts. None of the companies had provisions for the payment of differentials for late-shift work.

Paid vacation policies were reported by 24 of the 37 plants studied. The length of the vacation period and conditions of eligibility varied to some extent. The most common practice, which was reported by 11 plants, provided for a one-week vacation after one year of service. Two plants granted a one-week paid vacation if 1,120 or more hours of work were performed in a year, and 2 plants allowed one-half day for each month of service in a year, and 2 plants allowed a one-week vacation after 3 years of service. The large majority of the plants having one-week vacation plans computed the vacation pay on the basis of 40 hours at the straight-time rate.

Twenty-four establishments reported entrance rates for common laborers ranging from 50 to 78 cents an hour. Seventeen of them had entrance rates of 70 cents or more an hour, while the other 7 establishments had rates below 67 cents an hour. Only one plant provided for automatic increases in the common-

AVERAGE HOURLY EARNINGS[1] OF MALE WORKERS IN SELECTED OCCUPATIONS, LIMESTONE AND RELATED PRODUCTS, NORTHWESTERN OHIO, OCTOBER 1944—PART II

Occupation and Class	Number of Establishments	Number of Workers	Straight-Time Hourly Earnings				
			General Average	Lowest Establishment Average	Highest Establishment Average	Union Establishment Average	Nonunion Establishment Average
Lime pickers	9	42	$0.74	$0.65	$0.80	$0.74	$0.75
Locomotive engineers	22	70	.77	.50	.90	.79	.73
Machinists, maintenance, class A	6	8	1.03	1.00	1.06	1.03	1.03
Machinists, maintenance, class B	5	9	.93	.87	1.02	.97	(3)
Maintenance men, class A	9	13	.96	.72	1.04	1.01	.91
Maintenance men, class B	14	23	.82	.50	.90	.84	.75
Mechanics, automotive	6	15	.77	.67	.85	.78	.75
Mechanics, maintenance, class B	12	19	.81	.75	.90	.81	.....
Mill men, class A	16	26	.82	.55	1.09	.83	.78
Mill men, class B	15	34	.76	.72	.85	.77	.75
Mill men, class C	12	51	.73	.50	.80	.75	.72
Millwrights, maintenance, class A	2	13	1.10	(2)	(2)	1.10	.....
Millwrights, maintenance, class B	3	14	.88	.78	.98	.95	(3)
Oilers	9	30	.81	.50	.87	.82	.68
Pitmen	7	19	.71	.55	.86	.72	.69
Pulverizer operators	7	19	.73	.71	.74	.73	.....
Repairmen, boiler	3	5	.93	.90	.95	(3)	(3)
Rock breakers	3	33	1.09	.72	1.21	1.09	.....
Screen men	15	30	.75	.50	.85	.78	.71
Shovel engineers, 1¼ cu. yd. and under	22	35	.85	.55	1.05	.86	.84
Shovel engineers, over 1¼ cu. yd.	24	58	.92	.72	1.14	.93	.89
Steam-shovel crane men	9	16	.79	.74	.85	.77	.85
Stock clerks	3	3	.77	(2)	(2)	(3)	(3)
Stock men, head	3	3	.93	(2)	(2)	(3)	(3)
Stock men	4	8	.81	.65	.88	.83	(3)
Stone pickers	3	10	.71	.70	.74	.70	(3)
Truck drivers	32	169	.78	.50	.90	.81	.73
Watchmen	15	30	.71	.65	.78	.71	.72
Welders, hand maintenance	10	24	.96	.81	1.00	.97	.93
Working foremen, processing departments	6	14	.91	.70	1.00	.96	.73
Working foremen, track	7	7	.80	.75	.85	.80	.....
Yardmasters	5	6	.88	.74	1.01	.88	(3)
Yardmasters' helpers	5	9	.75	.70	.80	.75	(3)

[1]Exclusive of premium payments for overtime and night-shift work.
[2]Low and high averages not shown to avoid the identification of individual establishments.
[3]Too few plants and, or, workers to justify the presentation of an average.

labor rate. These increases amounted to 5 cents an hour after 3 month service and another 3 cents an hour after a period of 6 months' employment.

Average Hourly Earnings Straight-time average hourly earnings, excluding premium payments for overtime and late-shift work, but including incentive payments, are shown in the table on pages 94 and 95. In addition to general averages, separate averages are shown for each of the selected occupations by unionization. No comparison has been made of earnings of time and incentive workers, as incentive methods of wage payment were found in only 2 of the selected occupations studied.

The lowest and highest plant averages are also shown in the accompanying table for each of the selected occupations. However, the lowest and highest establishment averages are not necessarily the lowest and highest rates paid to individual workers. The wide range in plant averages may be ascribed to factors such as size of operation, type of plant, and unionization.

The average hourly earnings of workers included in the survey ranged from 67 cents an hour for locomotive brakemen to $1.15 an hour for class A refractory bricklayers. Slightly more than 50 per cent. of the workers were employed in occupations having average hourly earnings of 80 cents or less an hour, while only 3 per cent. of the workers earned over $1.00 an hour.

Approximately three-fourths of the workers in the selected occupations were employed in unionized plants. A comparison of earnings of workers in unionized and nonunionized plants can be made in 37 occupations. In 29 of these occupations, workers in unionized plants had average hourly earnings ranging from 1 cent to 23 cents an hour higher than those of workers in nonunionized plants. The rates in two occupations, lime burner and class A machinist, were identical in both unionized and nonunionized establishments, while in the other 6 groups, the workers in nonunionized establishments earned from 1 cent to 8 cents an hour more than those in unionized establishments. It should be noted that the 2 plants having incentive methods of wage payment were among the 11 plants in the large-size group which were unionized at the time the study was made.

Methods (*from page 82*)

the stockpile structure where it is discharged on the 42-inch by 400-foot distributing conveyor. Under the 50,000-cu.yd. stock pile is a 42-inch by 600-foot tunnel reclaiming belt-conveyor which discharges back on the reversible conveyor for barge loading.

The Glacier Sand & Gravel Company was operated for many years by John T. Heffernan, assisted by his sons, John F. Jr., and N. G. Heffernan. In 1943 the company was taken over by the Klinker Sand & Gravel Company of Seattle and it is now owned by the Henry J. Kaiser Company.

Wisconsin (*from page 91*)

ment is driven by a Caterpillar D13,000 Diesel engine.

The smaller Universal plant was operating on the same contract on Highway 33 but was located 2½ miles east of Cashton. Stone was loaded into Sterling dump trucks by

Power for the feeder and crusher at the Elroy plant is supplied by this engine.

a 1½-cubic-yard Bucyrus-Erie shovel. The air for drilling was supplied by a Gardner-Denver portable compressor.

This plant is fundamentally the same design as the other but has a 20- by 36-inch jaw crusher, which, with the feeder and conveyor, is driven by an International UD18 Diesel engine. The 3- by 6-foot Simplicity 2-deck screen, the 30-inch roll crusher, the elevator and final conveyors are driven by a General Motors 2-cycle Diesel engine.

The company uses Fiske Lubriplate wherever possible, especially in hot weather.

Buy Victory Bonds

Old Mica Mine, Closed Fifty Years, Reopened

In order to aid the war effort, four brothers—James, Howell, Luzerve and Maynard Holcombe—reopened an old mica mine at Granby, Connecticut, on the property of their father. The mine, which had been closed for 50 years, formerly supplied mica for axle grease and "windows" for heating stoves.

Slight Increase Reported in 1944 Slate Production

Slate production in the United States in 1944 amounted to 477,840 short tons, valued at $5,004,195, according to figures compiled by the Bureau of Mines, United States Department of the Interior. This was an increase of 2 per cent. in quantity and 3 per cent. in value over 1943 production—468,860 short tons, valued at $4,870,237. This small gain was confined almost exclusively to granules and flour.

Correction

In the article on the Mexican cement industry published in the July, 1945, issue of PIT AND QUARRY the impression was given that the plant of Cementos Guadalajara is now being operated under another name. Actually the original name has been retained in spite of a recent change in ownership.

In the same article a photograph of a Nordberg 3-foot short-head cone crusher and a Nordberg Symons vibrating screen was listed as being in the plant of Cementos de Mixcoac. Actually this installation is in the plant of Cementos Mexicanos in Monterrey.

A photo of a Plat-O vibrating screen in the Mixcoac plant was described as being made by the Deister Concentrator Company, instead of the Deister Machine Company.

American aviation engineers at a B-29 base in the Marianas Islands who were in charge of an asphalt plant turned out more than 32,800 tons of black top during the first 196 hours of operation. It was estimated that this quantity would have surfaced 27 miles of a modern 20-foot highway. The average hourly output of the plant was 163 tons, and the record hourly output reached 180 tons.

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RYERSON STEEL

The Lime Plant Operator

By WOLF G. BAUER

Introduction

another P&Q exclusive

THE writer has been asked by PIT AND QUARRY *to conduct a lime department which will feature monthly articles on the various phases of lime manufacture, and interesting discussions, questions and answers, and special contributions in descriptive, sketch, or photographic form submitted by readers and operators in the field. It is the author's aim to make this department of special help and interest to the foremen, skilled operators and superintendents, as well as the chemists and managers of small and medium-sized plants.*

We feel that the lime industry is moving forward, along with the many new lime demands and markets. We can expect the uses of lime as a basic chemical to continue to increase. This, however, does not mean that all present lime producers will continue to expand and find an increasing market for their product. It does not signify a corresponding increase in profits, nor will the type of lime now manufactured necessarily continue to find the widest application. On the contrary, it is much more logical to suppose that lime will become more difficult to manufacture in order to meet new specifications. Competition will come from more distant areas. Lower prices will probably apply to products much superior in quality to those now made. Lower manufacturing costs, constancy of good quality, and diversity of products—these will become goals toward which all operators must chart their courses. This is a much more serious problem for the small and medium-sized plant than for the larger ones, and it is especially with their needs that this department will deal.

Wolf G. Bauer

CONSIDERATIONS IN STREAMLINING SMALL AND MEDIUM-SIZED LIME PLANTS

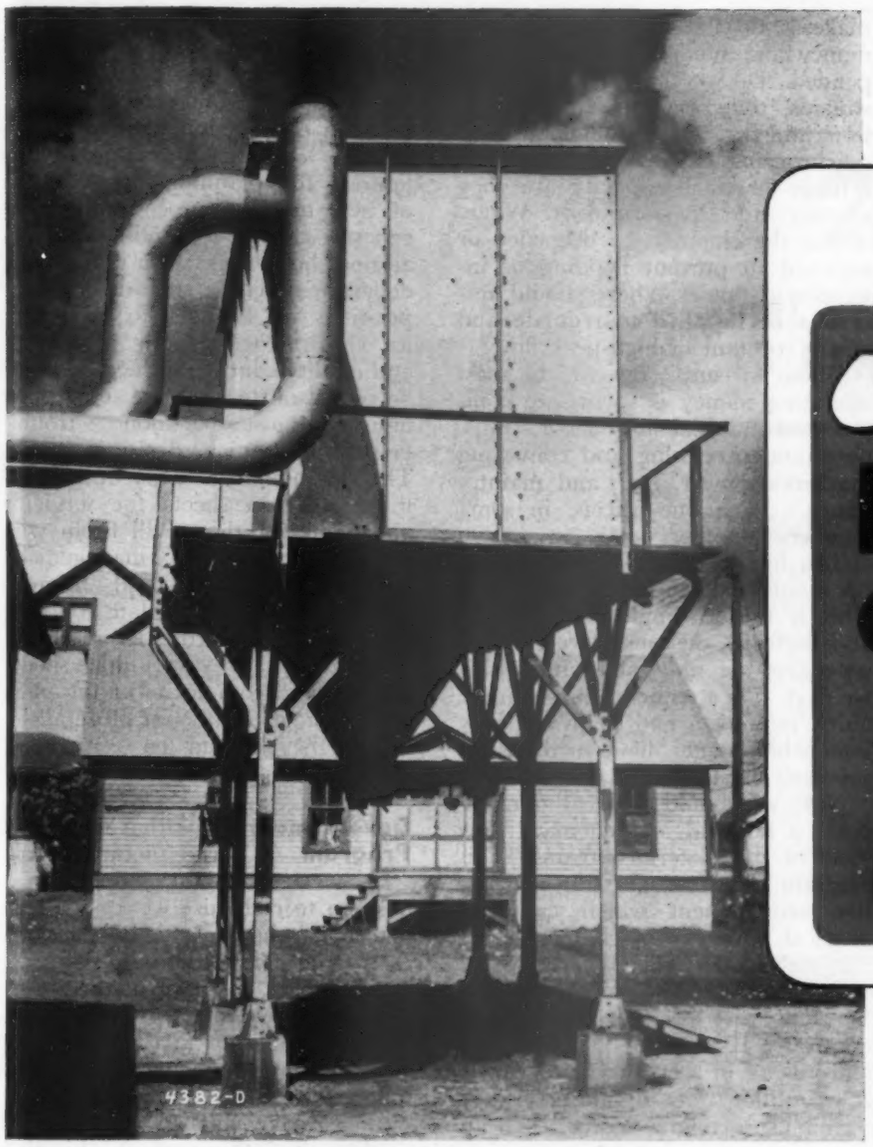
We chose this subject for our initial article simply because it, in a way, makes us cognizant of the phases in lime manufacture with which we will deal in more detail in subsequent issues. It summarizes, in a preliminary manner, our aims and indicates in what directions we may move to accomplish them.

First, we should qualify what is understood by a small or medium-sized operation. This, in some minds, may be a fixed idea of some specific size, based on the number of men employed, the amount of stone or lime processed, the number of kilns, or the diversity of the plant's products. All these factors are measures of size, but we shall arbitarily take the size of the lime output alone, as there are many plants which buy their stone and so manufacture only the burned or hydrated products. So we may designate an operation as small when its maximum kiln output is less than 50 tons per day, and as medium when its output is 50 but less than 200 tons per day. It is true, one can immediately visualize a compact 3-kiln plant of 200-ton daily lime capacity and another of the same lime output having five times the investment, labor, kilns, or number of stone products. But since we are concerned here chiefly with lime, we shall take this as our measure of size.

It should, first of all, become known by every lime producer that, according to the latest figures, the lime industry in the United States has furnished less chemical lime to the consumer industries than the total amount of chemical lime manufactured by some of the lime-consuming industries themselves. The Bureau of Mines classifies the latter products as "captive lime". In other words, over half the total chemical lime produced in the country is manufactured by other than commercial lime plants. This is a fact worth serious study. The lime industry ought to know why. It should know in what direction the trend will be.

Planning Needed So, if we go on the reasonable assumption that the road will be definitely uphill for the small and medium-sized lime operator, let us see what can be done. Most plants know where the shoe pinches, where bottlenecks become cost items, and what ought to be done in this or that department to improve operations. But to streamline an operation, a master plan must be evolved which takes more into consideration than a foreman's pet peeve. It is seemingly a simple process to find faults and start spending money on improvements here and there, but when limited capital is available, improvement money must be stretched. With

WOLF G. BAUER, who has accepted our invitation to conduct this department in Pit and Quarry, has had many years of practical experience in the manufacture of lime. After his graduation from the University of Washington in ceramic engineering he received a part-time fellowship for research work done in co-operation with the Bureau of Mines Northwest Experiment Station, and then returned to the university for a fifth year to earn his Master's degree. He was awarded membership in Sigma Xi Science Honorary for his research activities. Later he conducted a geologic and mining survey for the Skagit Talc Company under the direction of the Bureau of Mines. He then entered the lime industry, where he spent three years as chemist, engineer and assistant superintendent of the Roche Harbor Lime & Cement Company. During the next three years he served the Washington Brick & Lime Company as lime and ceramic engineer. Since then he was associated for more than three years with Victor J. Azbe, and is now practicing as a consulting engineer in the nonmetallic-minerals field.—Directing Editor.



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many operations it will mean simply sinking money into new equipment to replace the old, which by now is worn to the last patching job. However, the need to acquire new equipment is great, not simply to replace the old but to furnish facilities that will form the first step in a complete modernization and stream lining program.

In order to survive and conduct a simple, compact operation which, within its sphere of influence, can compete against the fellow with the high-grade deposit, or the large and low-cost-per-ton-plant output or the increasing threat of the "captive lime" trend, a producer will need to do more than replace worn-out equipment. He will need to adopt a carefully worked out plan of attack which considers costs, quality, and new product possibilities.

To many operators the whole thing boils down to mechanization. But mechanization is a loose and general term. The writer is acquainted with numerous plants whose owners have invested heavily in machinery for stone preparation, lime processing, and transportation, and yet a long time will pass before the investment will be repaid through the labor or time saved. Some operators look upon their plants and processes as things to which ordinary proved methods of job, time-motion studies, or cost analyses do not apply.

Even in small operations it is often difficult to visualize the cost of running certain machines or performing certain jobs in relation to the total cost of the manufactured product. One observes certain awkward or time-consuming ways of doing things. The obvious attracts attention, but the obvious is usually not the greatest waster of time and money. Waste is more often composed of many leaks that drain constantly. To see clearly the wastes that occur in production time and costs, the producer must analyze the steps in his manufacturing processes and draw them up in such form and detail that they can be studied visually and retained by the mind as a moving picture. Only then can a streamlining program be intelligently and successfully instituted.

Flow Sheets Flow sheets take many forms and serve different purposes, and we shall need to construct various kinds in order to obtain the facts necessary for the proper evaluation of our improvement program. To begin with, we have many kinds of streams running through our mill and, in order to keep each one moving along and make it do its share of the work, money and supervision must be expended. Do we clearly picture these streams, their size, speed, composition, and the cost of channeling and synchronzing them? At what percentage of their capacity are they moving and performing? Where should the channels be deepened or widened to prevent flooding or intermittent flow? Where should reservoirs be installed to regulate and assure constant or high-peak flow?

These streams, on which most operating money is spent, are composed of material flow, labor, transportation, processing and conveying machines, power, fuel, and maintenance. Each one affects, in some manner, the other.

The first flow sheet to be drawn up should indicate the process flow. This is rather simple to construct, and indicates the successive steps of procesing the materials with which we deal. It is a sequence diagram for quick reference, and helps to show into what stages new methods or processes must be fitted.

Next we should have at our disposal a physical and chemical flow sheet of the material streams. This diagram pictures only the consecutive arrangement which causes a physical or chemical change in the material itself. This will later become an operations-control sheet, to be kept up to date for quality control. It will be discussed in more detail in a later article.[1] From it we obtain data on the crushing, screening, sorting, calcining, hydrating, drying, and separating efficiencies of the processing units.

The third type of pertinent diagram shows the capacity of all the machinery involved in processing, storing, and transporting. It pictures in succession and schematically all the manufacturing and conveying units, showing the average daily output compared to the maximum possible.

The next series includes routing diagrams depicting labor in terms of the number of workers per day attending every unit, the man-hours per ton of material flowing at each stage, and the power used by each machine. Each one will show the unit cost of the finished product.

These flow sheets, which should become work sheets, should be large and simple. Standardize on two main types — the block form and the schematic form — and have plenty of them printed or mimeographed. Leave space on each one for additional written entries, further breakdown of stages, or the addition of new units. These sheets will have numerous uses as their value is recognized. Management will use them in conjunction with weekly or monthly cost sheets and production figures; for planning the fitting-in of new units or processes into the general scheme; for finding and analyzing bottlenecks; for comparing department costs; for determining priorities on changes to be made; for charting trends; for production and quality control; in fact, they will be pulled out every time some plant figuring must be done, trouble pegged, or quick decisions made. The maintenance department will make its own sheets for servicing and copies of them will fit in with those prepared for management. The superintendent and foremen will keep theirs up-to-date for their own particular needs. Every operation should have some flow sheets, the size and complexity of the plant determining the amount of detail for which they should be constructed and maintained.

Development Program Now that we have a true picture of our plant and are in a position to recognize weak spots and determine the leaks and wastes in their true relation and importance to the whole, we must fit these facts into our development program. This development may take the form of expansion of productive capacity only. It may be that the post-war outlook makes higher and constant quality the all-important objective. Maybe the capacity and quality are ample but costs are definitely too high, or will be, when the capacity is lowered. Possibly the plant should enter other markets with new grades or by-products. These factors, then, determine what changes or additions must be made. Our operations analyses show us how best to make them.

New Equipment By streamlining we mean following modern trends. It is simple, though often costly, to exchange old equipment for modern units of higher efficiency. But it is not so simple, yet often less costly, to follow modern practice in streamlining overhead, maintenance, scheduling and dispatching, and synchronizing machinery and labor for the simplest, straight-line operation. Here we need to consider lost motion and intermittent waiting or idling periods of machines and their attendants.

Streamlining operations with new equipment generally means substitut-

[1] See also Bauer (W. G.). *Control Problems in Lime Manufacture*, PIT & QUARRY, *December*, 1942, *page* 56.

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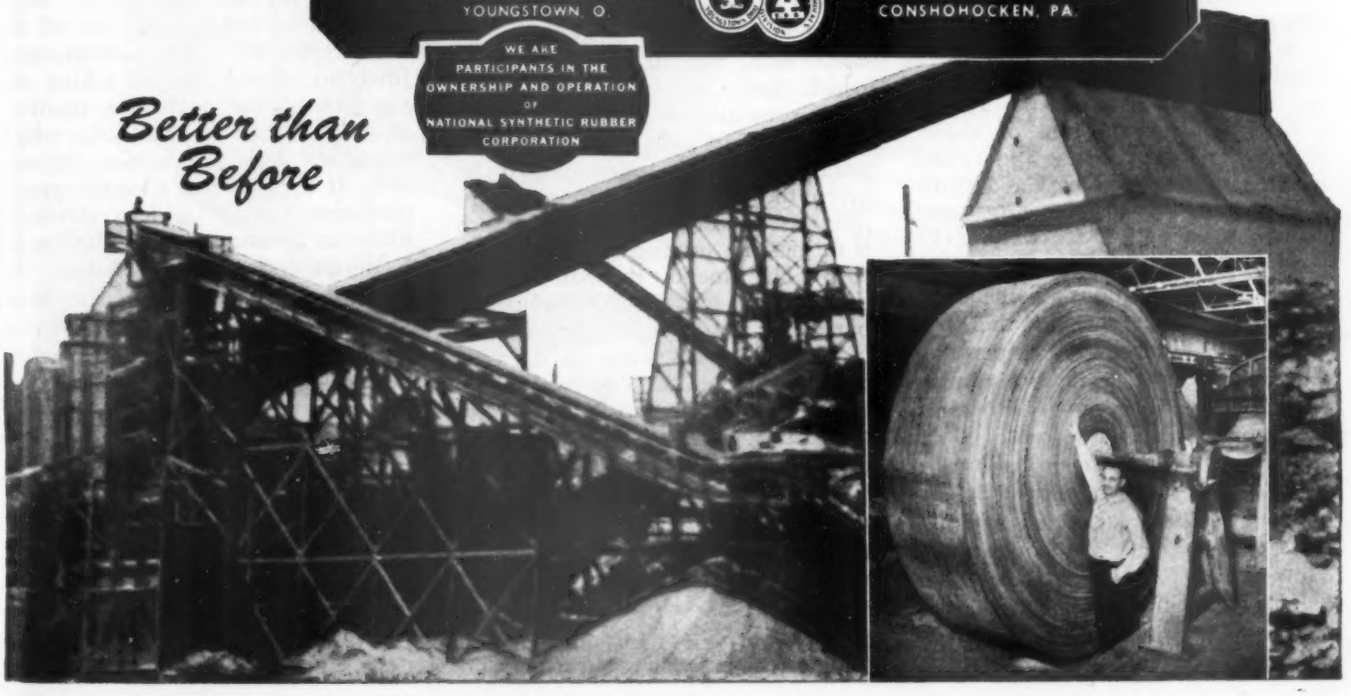

ing not only better machinery but also machines of larger size, since we recognize that the cost of machinery-tending labor decreases as the output increases. The important thing is to keep the larger unit busy, which means gearing other following or preceding units to the speed or capacity of the new machine. Often this can be done without enlarging other units by interposing large surge storage and the judicious employment of automatic controllers and feeders for uninterrupted operation following the surge-storage unit. Higher-efficiency and larger-capacity units can not be installed haphazardly at any point in an existing plant. Such a practice seldom results in the expected savings. To realize on the investment, somewhere along the line time and labor costs per unit produced must be cut drastically. Such a reduction should be the direct result of the new installation. It always entails re-scheduling and rearranging operations to and from such a new unit. This is as true in the case of power shovels, trucks, and crushers, as it is of lime kilns, grinding mills, hydrators, and conveyors.

Labor Streamlining operations through the proper use of labor entails job analyses, time-motion study, supervision and safety; and, for the smaller plants, careful and quick scheduling and shifting of men from one to another job without lost time. Close supervision of labor becomes more consequential in the small concern than in the larger one, for the cost of labor per unit of product is greater in the former.

All processes of a cyclic or periodic nature, where an attendant is involved, should be made automatic-continuous by the use of surge storage and controlled feeders. This is a little recognized point of waste, yet it occurs in loading and crushing in the quarry, as well as in lime burning, hydrating, bagging, and warehousing.

The modern trend is toward better working conditions. Some basic industries, such as the lime industry, have been among the last to perceive the importance of this subject, whereas others have gone all out for the happiness and comfort of their employees. Dust is probably the greatest cause of complaint, followed by poor lighting, lack of a working safety program, inadequate tool maintenance, insufficient washing and toilet facilities, and lack of job training. Streamlining opportunities here become obvious.

Overhead Streamlining by cutting overhead is fraught with obstacles and uncertainties, but if a courageous analysis is made, much can be done by many operators. Some type of overhead is due to the presence of a psychological complex, and it often takes an outsider to notice the shackles imposed on efficient production. Some operations started as independent and self-contained businesses that had to perform the public-service functions of a small town. Usually this burden was imposed by the location of the plant and the limitations of the available transportation, fuel and power supply, housing facilities, and shipping. But even though the relationships of such plants to their markets and supplies have changed considerably, some of these plants still concern themselves with businesses for which they are ill-equipped and which, although far removed from lime and stone manufacturing, nevertheless have their operating costs charged against the cost of the finished product. Such overhead may be carried along by larger concerns which can set up a business manager and staff for its administration, but the smaller operators should make an effort to concentrate on production only. After the war, when labor will be more plentiful, it should be much less trouble, for instance, to operate an employee bus service, than to administer a housing project and company store.

Maintenance The maintenance department frequently becomes a fertile field for hunting down waste. In small and isolated plants its duties take on added importance, not only in the dispatch with which breakdowns are dealt with, but in the manner in which they are forestalled. Good salaries to attract high-type technicians who are jacks-of-all-trades are paramount. Such men should be given the best equipment and supplies, as to foster good maintenance is to increase production and reduce costs. The time lost through a poorly supplied and staffed maintenance department, not only in the number of repair hours but also in the production time and labor wasted, is truly astounding. It is usually anything but obvious. To streamline this whole department is to create a good-sized check on waste.

Reports to Management Often management performs its functions at a distance from the plant. In such instances the daily, weekly, or monthly operations must be presented to the managing heads in such a form as to be immediately and constantly usable. The home office should be honest and find out what is really needed to tell the story. Studying profit-and-loss statements and balance sheets may show where costs are below or above normal. With current reports during the month such statements will also agree as to the cause — major production-volume changes, breakdowns, or shifting ratios of the types of products manufactured. But to streamline cost-finding we must combine it with fact-finding. For control and development accurate and short frequent reports on essential points are more valuable than detailed figures which come in late or infrequently. Management, if removed from its operations, must be able to visualize processing and its changes at every point where costs are involved. Grouped costs are seldom of much meaning, and will not point to sources of trouble or deficiencies. This is where our work flow sheets come in. They are a grid upon which reports may be superimposed, and they serve as a sort of "television" transcript of what is going on, what is being accomplished, and at what cost.

Every operation is different, and it would be impossible to set a standard or goal for manufacturing costs. Costs are relative to selling price anyway. Where one concern has costly stone preparation due to considerable stripping, it may, on the other hand, have low-cost fuel for burning or low-priced labor. In another transportation charges may make stone costly due to the haulage distance or rehandling, but this may be offset by the absence of waste rock and a ready market for all the stone quarried. The streamlining program should aim at taking advantage of the favorable features, and concentrate on those sales which cause the least production difficulties. If a plant has a costly quarry operation about which relatively little can be done, then it must make a double effort to mechanize the rest of the processing to the limit. Heavy investment in equipment may lower such quarry costs somewhat, but the same investment applied in the plant may lower the final product cost much more. It is management's job to make the scientific analysis and decision as to where streamlining money should be spent.

In succeeding articles we shall deal more directly and in a more concrete way with the means of accomplishing improvements in the many phases of lime manufacture.

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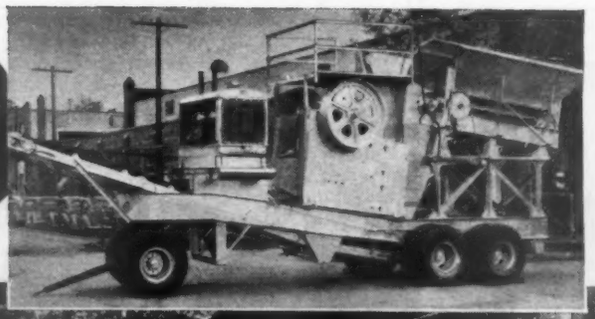

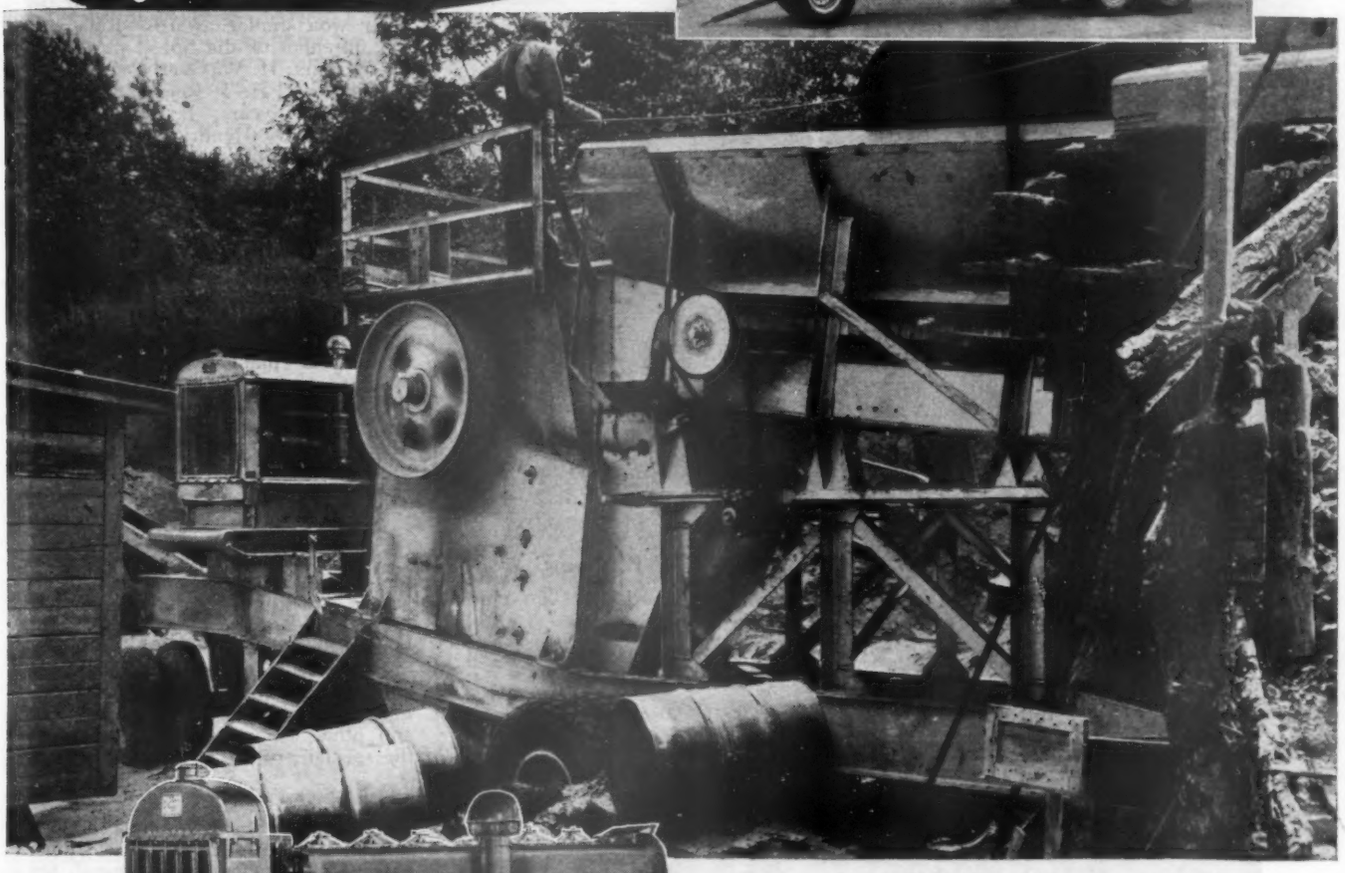

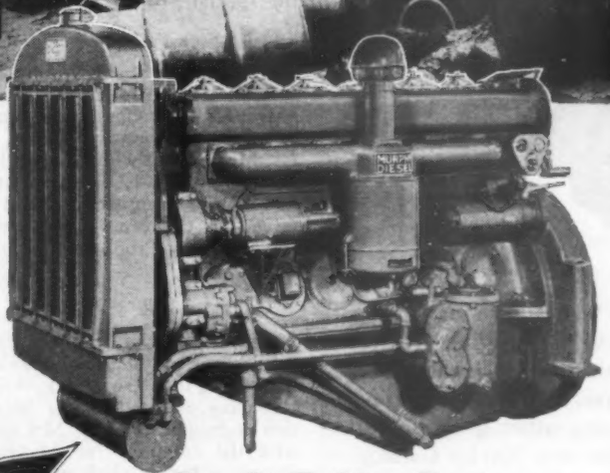

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PERSONAL MENTION

JOHN G. DAVIDSON, cashier and assistant secretary of the Louisville Cement Company, Louisville, Kentucky, was honored at a dinner at which he received a pin denoting 55 years of service with the company. Four other guests had previously won similar awards—Robert Hinton, foreman of the Speed power plant, for 59 years; H. W. Overly, general auditor, 58 years; H. T. Regan, Speed shovel foreman, 56 years; J. H. Lemmon, 56 years. Asbury Hendricks, machine shop foreman, is entitled to wear the 50-year pin.

JOHN MARSCH of Chicago, owner of the Walsh Sand & Gravel Company at Menominee, Michigan, has announced that he will sell his holdings, including 158 acres of land, machinery and equipment. The plant, which formerly was an important producer of aggregates in the Menominee area, is the last of the large Marsch enterprises to be sold. Mr. Marsch will go to Luxembourg this fall to visit his estate in the small Western European duchy.

RICHARD E. STOIBER, assistant professor of geology at Dartmouth College, is acting as assistant to the director of the Long Branch signal laboratory of the United States Army Signal Corps during his leave from teaching duties. Research and development work on quartz crystal units in controlling frequency in tactical and other communications equipment is the special project of this laboratory.

THEODORE F. ETGEN was appointed assistant comptroller of the Universal Atlas Cement Company, United States Steel Corporation subsidiary, on August 1. Mr. Etgen, who joined the company in March, 1944, as assistant to H. C. Schmielau, comptroller, had previously served for thirteen years as chief accountant of Sperry Products, Inc., of Hoboken, N. J.

BARGE MCCALL has been appointed local auditor of the Independence, Kansas, plant of the Universal Atlas Cement Company, United States Steel Corporation subsidiary. Mr. McCall has been with the company for 24 years and has served as senior clerk at the Leeds, Alabama, plant since 1943. He succeeds Wade W. Postelle, who returns to his former post as local auditor at Leeds.

FRANK TURVEY of Baltimore, designer of the M. J. Grove Lime Company's new primary crushing and screening plant at Stephens City, Virginia, has gone to Africa to design a stone plant.

P. H. STAUB, formerly assistant superintendent of the New England Lime Company magnesium plant in Canaan, Connecticut, has been appointed assistant to C. C. Loomis, president of the company. Mr. Staub succeeds John L. Weber, who died recently.

J. L. MINER, vice-president of the Atlas Lumnite Cement Company of New York, was recently named a member-at-large of the Committee on Nomenclature and Definitions of the American Society of Testing Materials. Mr. Miner succeeds the late Cloyd M. Chapman.

COLONEL W. N. CAREY, who formerly served as chief engineer of the Federal Works Agency, has been appointed national executive director of the American Society of Civil Engineers, to succeed George T. Seabury, who passed away recently.

R. C. MARCELLUS has left his position as chief engineer of the Western Knapp Engineering Company to become chief engineer of the Baroid Sales Division of the National Lead Company in Los Angeles.

K. G. LINK, technical supervisor of the Aluminum Ore Company at East St. Louis, Illinois, is in charge of operations for extracting additional alumina from the rejects of the Bayer process.

PEARSON E. NEWMAN of New York City has been named a vice-president of the Freeport Sulphur Company and subsidiaries, which include the Cuban American Manganese Corporation and the Nicaro Nickel Company.

ALEX J. LATYN had been made mining engineer of the Canadian Johns-Manville Company at Asbestos, Quebec. Mr. Latyn formerly was associated with Chromite, Ltd., in a similar position.

J. R. THOENEN, who has been district engineer for the Bureau of Mines at Little Rock, has been made chief of the Tuscaloosa division of the Bureau's mining branch.

J. CLARK recently was made manager of the Gypsum Mines, Ltd., Robertsbridge, Sussex, England.

C. H. JOHNSON, former United States Bureau of Mines district engineer at Silver City, New Mexico, has been named division chief of the Rolla, Missouri, mining division of the Bureau.

J. J. BASSETT, for 35 years associated with the Lehigh Portland Cement Company at Oglesby, Illinois, and plant superintendent since 1937, has announced that he will retire from active duties on October 1.

JOHN E. SANKEY, manager of the Chicago Gravel Company, has been appointed a member of the new municipal planning commission which will direct the post-war development of Springfield, Illinois.

ARTHUR C. HEWITT, has been appointed chief engineer of the Warner Company.

OBITUARY

JAMES OTTO FISHER, a junior geologist with the United States Geological Survey, was killed in action while serving with the United States 1st Army in Germany. Before his association with the Survey's fluorspar program in 1943 he had planned and conducted a six-month exploration for fluorspar deposits in Newfoundland.

JOHN A. LOGAN, 66, attorney for the Kentucky Rock Asphalt Company of Louisville, Kentucky, died recently at his home in Bowling Green. Mr. Logan was one of the founders of the Kentucky Rock Asphalt Company.

THEODORE A. SENN, 70, sales manager of the grindstone department of the Cleveland Quarries Company and a veteran of more than half a century in the sandstone business, died of a heart attack on August 13 at his home in Euclid, Ohio.

Mr. Senn, who was one of the oldest employees of Cleveland Quarries Company, entered the sandstone business in 1895 with the old Cleveland Stone Company, predecessor of the present firm. He completed a half century of service last April.

ARNOLD A. SHANELY, secretary and superintendent of construction at the Louisville Asphalt Company of Louisville, Kentucky, died on August 10 at the age of 55. Mr. Shanely had been associated with the firm since 1918.

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Legal Decisions

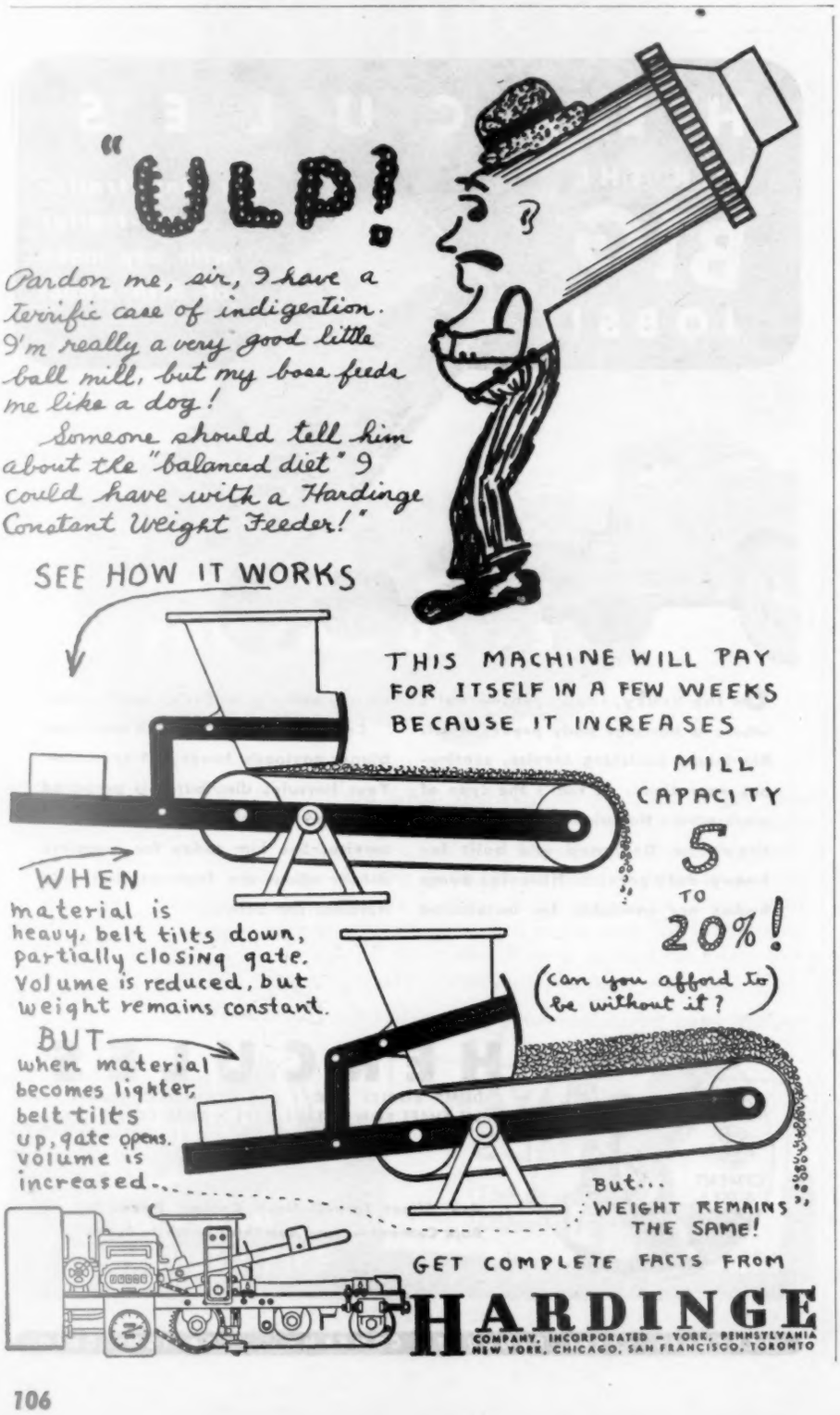
By LEO T. PARKER

State Law Interpreted

Although modern courts will not vary the clear meaning of a state law, they may "add to" an incomplete law. For example, to *Kuntz v. Alliance Sand Company,* 40 Atl. (2d) 864, reported March, 1945, a state law was litigated which provides that the disability or death of an employee, caused by silicosis, anthraco-silicosis, or asbestosis shall be paid jointly by the employer and the state if the disease developed five years before the application was filed.

An employee became totally disabled by silicosis contracted in a quarry and crushing plant. He had worked in the plant *almost* 5 years before he became disabled. In view of the above state law the lower court held the employer *solely* liable for compensation of $3,600. The higher court approved this interpretation, saying:

"We have no doubt that the legislature intended that the commonwealth should be liable for a portion of an award for compensation in a silicosis case *only* when it developed after an exposure of five or more years."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Pardon me, sir, I have a terrific case of indigestion. I'm really a very good little ball mill, but my boss feeds me like a dog!
Someone should tell him about the "balanced diet" I could have with a Hardinge Constant Weight Feeder!"
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THIS MACHINE WILL PAY FOR ITSELF IN A FEW WEEKS BECAUSE IT INCREASES MILL CAPACITY 5 TO 20%!
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Mechanic's Lien

Recently a higher court held that a separate claim for a mechanic's lien must be filed within the time limited by the state statute for the respective contract on the same building. For illustration, in *Ideal Stone Company v. Dohse,* 16 N. W. (2d) 151, reported December, 1944, it was shown that a stone company supplied materials to a contractor to complete *two* distinct contracts on the same building. The stone company failed to file a mechanic's lien, within the period specified by the state laws, to secure payment for the materials used by the contractor to complete both contracts. The higher court held that the lien was void with respect to the materials supplied to complete the first contract, because this lien was not filed within the statutory period. The court held the lien valid on the last contract because it was filed within the statutory period.

Also, see *Ballou v. Black,* 23 N. W. 3. In this case only *one* contract was involved. This higher court held that a lien was filed in due time, although the lien was filed *more* than the statutory period from the date the *first* deliveries were made. Also, in *Bradford Company v. Creel,* 93 Neb. 573, 141 N. W. 145, it was shown that a seller furnished, at different times, materials for construction of a house. The higher court held the seller entitled to a mechanic's lien for the remainder due him, where he filed the lien within the statutory period the last delivery was made.

Mechanic's Lien Not Allowed

Frequently sellers of nonmetallic materials can not recover payments for money due simply because they fail to realize that all suits filed under mechanic's lien law must clearly specify that the seller is a "material man" and, all others to whom sales are made, also, are material men who sell products to contractors. For illustration, in *Hillsdale Gravel Company v. Dennehy Construction Company,* 185 S. W. (2d) 583, reported April, 1945, it was shown that the gravel company furnished materials to the Cement Products Company which manufactured concrete blocks. The latter made a contract to supply concrete blocks to a construction company which was erecting a building. The cement company failed to pay the gravel company which filed suit to collect the amount due. Also, the gravel company sought to secure a mechanic's lien on the building under a state law which gives liens to building-material men who sell material to subcontractors. The higher court refused to award the gravel company a lien on the building.

Mortar Box Must Be Guarded

The higher courts recognize a distinction between the discretion of normal children and that of adults. While an adult who trespasses on private property can not ordinarily recover damages for an injury, the law with respect to children is different. For example, in *Johnson v. Wood,* 21 So. (2d) 353, reported April, 1945, it was shown that a sand-and-gravel company kept on its premises a mortar box in which there was a mixture of lime, sand, and other ingredients. The box was unguarded and unprotected and was near the street. One day a boy threw some of its contents in the face and eyes of another child whereby the latter lost the sight of one eye and suffered an impairment

of its hearing. The child's parents sued the company for damages. Although the lower court held the company not liable, the higher court reversed the verdict, saying:

"It is a well-known fact that a mortar box will lure children of tender years, while it would repel those of more mature years. . . . In a case like this, it is no answer to say that appellant (child) had no business there or that her parents should have forbidden her going on the premises."

The legal motto of this decision is: While a danger may be apparent to one of mature years, it is not so to one of tender years. Therefore, no dangerous thing attractive to children should be left unguarded.

Federal Law Applicable

Considerable discussion has arisen from time to time over the legal question: If a company causes damage to private property while performing work authorized by the federal government, who is liable? The answer is: the government is solely liable and, furthermore, the suit must be filed in a federal court and not in a state court. For illustration, in *Scanlon v. Iron City Sand & Gravel Company,* 29 Atl. (2d) 82, it was shown that the federal government licensed the company to take sand and gravel from the bottom of a river. Thereafter, a man named Scanlon purchased an island in the river for $2,000. Later Scanlon sued the sand-and-gravel company and alleged that the dredging damaged him in the sum of $50,000 and that he was entitled to recover three times that sum pursuant to a state law. The higher court refused to allow Scanlan any damages, saying that, if Scanlon sustained any recoverable damage due to the federal government's authorized work, Scanlon's remedy, if any, was under the federal law.

Easement Implied

Modern higher courts will imply an "easement" where the implication is required in fairness and justice to a purchaser of real property. For example, in *Lively,* 182 S. W. (2d) 990, reported September, 1944, it was shown that an owner of two tracts of land sold the front tract to a company. Later the owner sold the rear tract but he forgot to include in the deed a clause of a reserved right-of-way. In subsequent litigation the higher court implied that the purchaser had a legal right-of-way through the front tract.

Court Follows Law

Modern higher courts consistently hold that compensation can be paid to employees *only* under expressed or implied provisions of the State Workmen's Compensation Act. In other words, a court must base its decision solely upon state laws. For instance, in *State ex rel. Yuska v. Industrial Commission,* 58 N. E. (2d) 214, reported January, 1944, it was shown that an employee sued the Industrial Commission of Ohio to compel payment of compensation for *partial* disability resulting from silicosis contracted during exposure to silica dust for more than three years.

During the trial it was shown that the state law provides that compensation, on account of silicosis, shall be payable *only* in the event of temporary total disability, permanent total disability, or death. In view of this peculiar state law the higher court refused to allow

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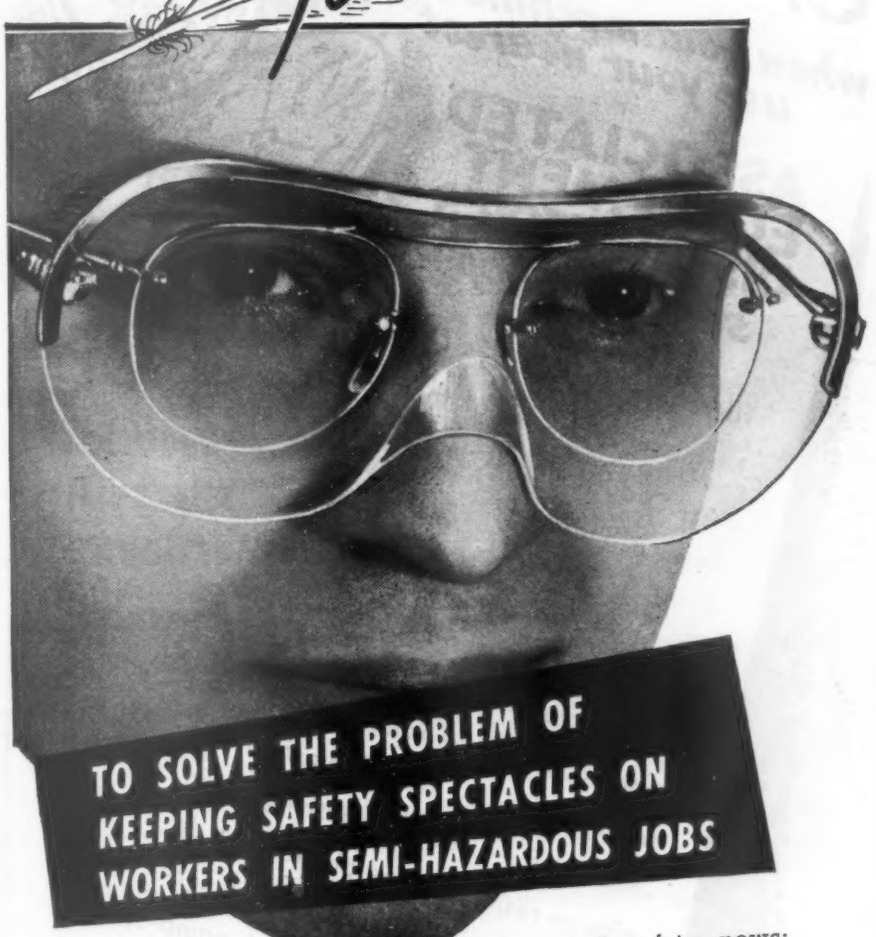

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any compensation to the employee, saying:

"This unambiguous, inescapable language not only makes no provision for partial disability but expressly limits compensation to employees who have experienced total disability."

Although the employee complained that a state law is unreasonable which provides for compensation for total disability, and not for partial disability, the court said:

"This, of course, is a matter with which this court is not permitted to concern itself."

This court said further that it must base its decision upon the *strict* meaning and interpretation of valid state laws, and that if the legislature passed impractical laws the court could do nothing about it.

Adverse Possession Gives Title

In every state laws have been enacted which award legal ownership of land to anyone who *adversely* occupies the land for more than a stipulated period of time, usually 15 or 18 years. These state laws are valid.

In *Skaggs v. Ohio Valley Rock Asphalt Company*, 166 S. W. (2d) 1005, it was shown that a person named Skaggs sued the asphalt company and demanded that the latter be ejected from certain land to which the former claimed legal title. During the trial the testimony proved that Skaggs held a recorded title and had not only occupied for over 15 years the premises described in the deed but, also, had held possession of certain land adjacent to his property. A state law provides that anyone who holds and occupies land for over 15 years automatically becomes its legal owner. Therefore, the higher court held that Skaggs is the legal owner of the property situated *adjacent* to his land and which he had not paid for but had occupied for more than 15 years.

Vaccination Kills Employee

A modern higher court has held that an employee suffers an "accidental" injury when the employer requires the employee to be vaccinated and the wound becomes infected, thereby causing death and disability. Moreover, the employer is liable for payment of compensation if he ordered the employee to be vaccinated.

In *Alewine v. Tobin Quarries*, 33 S. E. (2d) 81, reported April, 1945, it was shown that a quarry company hired a truck driver. He was informed that he could not go to work until he was inoculated against typhoid fever and vaccinated against smallpox. In vaccinating him against smallpox the scratch method was used. The vaccination was successful and the scar became slightly inflamed. He returned to his work, but the condition of his arm never improved. Three weeks after being vaccinated the employee, after a restless and painful night, started to work as usual and soon afterward he complained of being cold and a few minutes later collapsed, becoming unconscious, and died. The dependents of the employee sued to recover compensation under the State Workmen's Compensation Act.

Various arguments were made against the allowance of compensation. It was contended, for instance, that the death was not caused by the vaccination but resulted from a cerebral hemorrhage; that if the death had been caused by an infection of the vaccination wound, such

infection did not arise out of and in the course of deceased's employment; and the vaccination was not for the benefit of the employer, but was requested by a state agency; and further that the death did not result from an accident. Notwithstanding these arguments the higher court held the employee's dependents entitled to recover compensation.

Also, see the leading case of *Neudeck*, 249 Mich. 690, in which an award for compensation was upheld where the employee was ordered by his employer to be vaccinated and was vaccinated at the employer's plant by a doctor employed by the employer.

On the other hand, there are a line of higher court cases holding that where an epidemic of disease exists and vaccination is ordered, *not* by the employer but by health authorities, no liability rests on the employer for any injurious consequences resulting from such vaccination. See, *Smith*, 111 Conn. 365; *Krout*, 200 Mich. 287; and *Jefferson Company*, 312 Ill. 575.

Carry Workmen's Insurance

An employee may suffer an injury with or without negligence on the part of his employer and if the latter is protected by State Workmen's Compensation Act the employee may recover compensation. However, an employee not entitled to workmen's compensation must prove that his employer's negligence resulted in the injury, otherwise the employee can not recover damages.

In *Kendrick v. Lynn Sand & Stone Company*, 59 N. E. (2d) 702, reported April, 1945, it was disclosed that after the face of a cliff was blasted a large amount of rough and broken stone of various sizes was heaped upon the quarry floor in front of the face. It then became necessary to drill and blast the larger stones. This was done by so-called "pop-hole" blastings. One day an employee, with several others, lighted fuses and ran toward the entrance of the quarry. He was struck by a stone when he had reached a point 565 feet from the source of the blasts. The employer, or quarry company, was not insured under the workmen's compensation law.

The injured employee sued the quarry company for damages, on the contention that the company was negligent because no shelter was provided for the various employees who lighted the fuses. The counsel for the company argued that the company was not liable, because adequate protection was furnished by two electrically operated shovels, which stood on opposite sides of the quarry 225 feet from the blast and that the injured employee was negligent by failing to use the shovels for protection instead of running 300 to 400 feet farther to the entrance of the quarry.

The higher court refused to agree with this contention and held the quarry company liable in damages. This court said:

"It seems plain that the jury could find that the danger of being hit by a stone from a 'pop-hole' blast at a distance of 565 feet was not an obvious risk of the work which the plaintiff impliedly agreed to assume when he undertook the employment. . . . The jury was not required to believe that the shovels, constructed for an entirely different purpose and located well within the distance to which they could find stone would fly from even a normal 'pop-hole' blast, were an adequate shelter."

Employee Disobeys Company Rules

Modern higher courts consistently hold that willful violation by an employee of a statute or company rule designed for his protection is "willful misconduct" which bars the employee from recovering compensation for an injury under the State Workmen's Compensation Act.

For example, in *Carrico v. State Compensation Commissioner*, 33 S. E. (2d) 281, reported May, 1945, it was shown that an employee disobeyed a company regulation which provided that all employees must wear approved goggles when breaking top, taking up bottom, breaking rock, cutting hitches and holds for crossbars, or while engaged in any other work where flying particles might injure the person or eye. An employee was injured while engaged in a type of work in which, for his own protection, he was required by the rule to wear goggles. His excuse for not using the goggles was that the work he was doing required good sight, and that when wearing goggles they warmed up or "steamed up" and impaired his vision. This higher court held that an employee's intentional and deliberate violation of his employer's rule, requiring wearing of goggles for certain dangerous work, constitutes "willful disobedience" and bars recovery of compensation.

Stone Company Employs Infant

Frequently companies whose officials are reasonably careful may nevertheless violate a state law which forbids employing infants. Usually the company may avoid payment of damages or compensation if the evidence proves that the infant misstated or falsely represented his age.

For instance, in *Caldwell Stone Com-*

See this "N-H"

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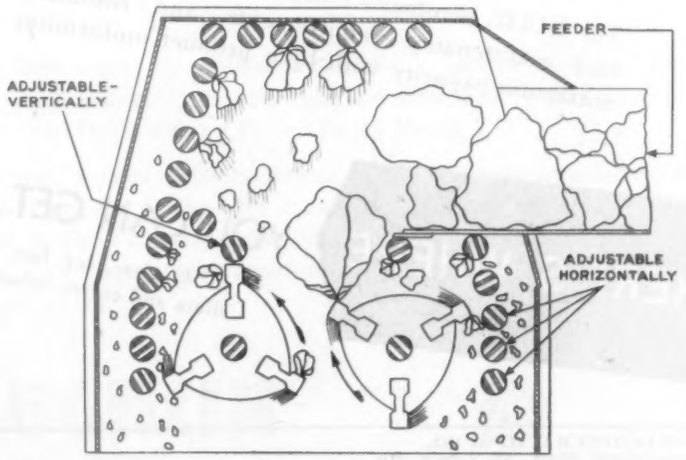
Model 3030 operating in limestone quarry owned by D. M. Stoltzfuss & Sons Co., Quarryville, Pa.

Reduces run-of-the-quarry material as large as thirty inches to an optional minimum of eighty percent under one inch in one operation.

Handles 100 to 150 tons per hour with as little as 100 horsepower.

Combines expensive primary and secondary machinery in one operation.

For portable or stationary units.



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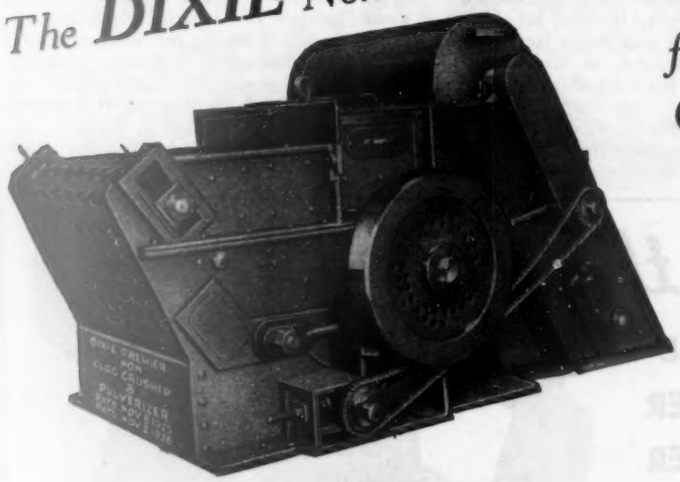

HERE'S WHY YOU NEED IT . . .

You've got to keep up with rapidly increasing demands for crushed rock—a basic need of industry and the armed forces.

The DIXIE Hammermill with its *exclusive* moving breaker plate guarantees continuous high feed and record production on any kind of material handled.

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in 40 sizes, for fine, medium and coarse reduction.

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Please send free booklet on Dixie Non-Clog Hammermills. We want to crush .....
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pany v. Jarvis, 185 S. W. (2d) 552, reported May, 1945, it was shown that a state law forbids the employment of an infant under 16 years of age "in, about or in connection with any mine, coke oven or quarry". A boy who had the appearance of being 18 years old represented himself to be of that age at the time he solicited employment with a stone company and signed the compensation register, although he lacked two months and ten days of being 16. Later the boy was killed and his mother sued the stone company for damages. The lower court held the company liable but the higher court reversed the verdict because the company did not willfully violate the state law.

Another important point of law, decided by this court, involved failure of the employer to obtain an age certificate from the boy.

This court held that the failure of the employer to procure an age certificate mentioned in a state law simply gave the infant the right to elect to sue for damages.

Deed Broadly Construed

Generally speaking, the higher courts will interpret deeds strictly in accordance with the plain meaning of written words used in them. For illustration, in *Ozark Black Marble Company v. Stephenson,* 186 S. W. (2d) 145, reported May, 1945, it was shown that a property owner gave a "stone deed" to the Ozark Black Marble Company. The company agreed to pay the property owner $100 per acre for all the land used in quarrying, or that the company might take in its business operations. The company spent about $4,000 in testing, sawing, polishing samples, surveying and promotional work. However, the company did not succeed in selling the marble at a profit and litigation developed over payments to the land owner where only small parts of certain acres were used. This higher court held that the company must pay $100 for each acre on which *any* work was done.

Courts' Decisions Vary

An example of variations of decisions rendered by modern courts is found in *Dixon v. New York Trap Rock Corporation,* 60 N. E. (2d) 385, reported March, 1945. The facts of this case are that a property owner sued the New York Trap Rock Corporation for property damage and personal injuries alleged to have been caused by blasting operations. The lower court allowed the property owner full damages. However, the Appellate Court, 267 App. Div. 963, modified the amount of damages allowed by the lower court. The case then was appealed to the higher court which reversed the Appellate Court and reinstated the damage allowance of the lower court. Whether this litigation will again be appealed remains to be seen.

Riparian Rights

Numerous higher courts have held that the dominant power of the federal government extends to the entire bed of a stream, which includes the lands below ordinary high-water mark, and that the exercise of the power within these limits is not an invasion of any private property right in such lands for which the United States must make compensation. However, a modern higher court has held that the United States is not clothed with unlimited authority to deal

with navigable waters, as if they were its own.

For instance, in *United States v. Commodore, Inc.,* 143 Fed. Rep. (2d) 720, it was shown that certain improvements of the navigability of the adjacent water damaged a corporation. The higher court allowed the corporation damages equal to its financial losses. This court said:

"While Congress, in the exercise of this power, may adopt any means having some positive relation to the control of navigation, it may not arbitrarily destroy or impair the rights of riparian owners by legislation which has no real or substantial relation to the control of navigation or appropriateness to that end. This riparian right is property and is valuable. . . ."

Fair Labor Standards Act

According to modern higher court decisions all employees are exempt from the Fair Labor Standards Act if their work affects the "safety of operation" of motor vehicles. For example, in *Levison v. Spector,* 59 N. E. (2d) 817, reported May, 1945, it was shown that the duty of an employee was to supervise checking, unloading and receiving inbound and outbound materials and freight shipped interstate. The employee sued his employer to recover back wages, overtime, lawyers' fees, and penalties under the Fair Labor Standards Act. The higher court held the employee exempt from this federal wage law because his duties substantially affected the safety of operation of motor vehicles used in interstate commerce. Therefore, the employer was held not liable.

Freight Rates Valid

When fixing freight rates the Public Service Commission must consider the shipper, carriers and the public, and also it must uphold reasonable and fair competition between competing carriers. For example, in *Southwest Stone Company v. Railroad Commission,* 184 S. W. (2d) 691, Texas, the higher court held that whether a freight rate is an unjust or unreasonable discrimination must be decided by testimony presented in detail during the trial. This court said:

"We see no material difference, so far as applicable freight rates are concerned, between asphalt-coated crushed stone, sand and gravel, and the same materials uncoated. No valid reason appears why both should not bear the same rate."

What Is Trespass?

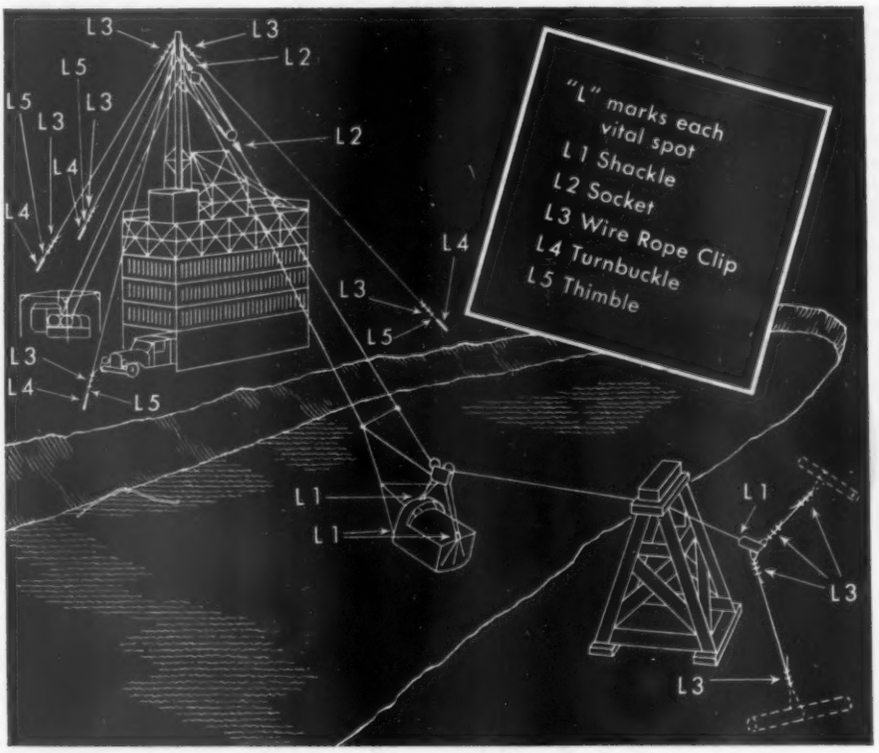
According to modern higher courts, legal "trespass" is any act which actually, or is likely to, cause damage to private property. For illustration, in *Young v. Pittman,* 29 S. E. (2d) 551, it was shown that a property owner proved that the use of dynamite within 200 yards of his spring, from which water was piped to his dwelling for domestic purposes, would endanger his home and spring. In view of this evidence the lower court granted an injunction against further blasting for mica and feldspar on these lands within 200 yards of the dwelling and spring. The higher court approved the verdict, saying: "The power of the court to restrain a continuing trespass, in proper cases, has been upheld in other jurisdictions."

Tax Sale Held Valid

Generally speaking, a tax sale of real property is valid if made in strict ac-

HANG ON TO YOUR MONEY

WITH THESE DROP-FORGED FINGERS OF STEEL



Wherever you use wire rope or chain — for hoisting and material handling in your plant, aboard ship, or on drag-lines for stripping and excavating — you can save money three ways by specifying Laughlin drop-forged fittings.

1. Save money on purchase price . . . because you can get *standard* fittings for almost any purpose from Laughlin's complete line.
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cordance with state laws. Example, in *Concho Washed Sand Company v. Sallstrom,* 157 Pac. (2d) 176, reported April, 1945, it was shown that a person named Sallstrom obtained title to land upon a resale deed by the county treasurer for $100, which was considerably less than the taxes due on that property. Later Sallstrom sued the Concho company to compel it to give up possession of the land. The company contended that the sale by the county was void because the $100 which Sallstrom paid the county for the land was much less than the taxes due. However, the testimony proved that the sale was made, according to state laws, to Sallstrom who submitted the highest and only bid for the land. In holding in favor of Sallstrom, the higher court said:

"A resale tax deed based upon the 1939 tax resale is not invalid because the property was advertised at the resale for less than the amount of taxes, interest, penalties and costs assessed against the property and delinquent at the time of the resale."

Contributory Negligence

Under all circumstances employees must use good judgment to protect themselves against being treated by a physician who, for any reason, is incapable of rendering satisfactory and proficient services. For instance, in *Champs v. Stone,* 58 N. E. (2d) 803, it was shown that an employee went to a physician for treatment. The physician at this time was grossly intoxicated. The employee saw that the physician was grossly intoxicated and refused to be treated by him. However, the latter insisted upon treating the employee, who submitted to being treated by him. By reason of not exercising the skill a physician should exercise the patient suffered severe injuries for which he sued the physician to recover damages. It is interesting to observe that the higher court refused to allow the employee any damages, and said:

"It is claimed the intoxicated condition of defendant (physician) was the proximate cause of plaintiff's injuries. Such condition was apparent to plaintiff before he permitted the defendant to inject the needle in his arm. . . . Ordinary care for one's safety would impel the ordinary careful and prudent person to seriously doubt the physician's ability and cause the patient to refuse treatment."

Thus, in this case it was admitted that the employee suffered severe injuries as a result of the improper care of the physician who was intoxicated. But the higher court refused to hold the physician liable in damages because the law expects *all* persons at *all* times to use *reasonable* care to safeguard themselves against injuries. In other words, all persons assume the risk of permitting intoxicated, or otherwise incompetent, physicians, to serve them.

Injuries and Permanent Disability

Obviously, whether an injured employee is entitled to compensation under the State Workmen's Compensation Act based upon permanent disability depends upon the degree or extent of his injuries. Very frequently numerous small injuries add to permanent disability.

In *Employees Lloyds v. Schott,* 183 S. W. (2d) 262, reported November, 1944, it was shown that an employee sustained injuries while attending to his regular duties in lifting sacks of cement from flooring where they were stacked to a concrete mixer. The employee introduced testimony before the jury showing that he suffered disability as a result of severely straining his back, shoulder, and arm, causing all the muscles, ligaments, etc., in such members and his right hand to be torn loose, and contused. The jury allowed the employee compensation based upon permanent disability. The higher court approved the verdict, and said:

"The sum total of plaintiff's (employee's) description of injuries produced, as he alleges, one whole result of total and permanent disability."

Questions and Answers

[Mr. Parker will be glad to answer questions regarding legal problems of PIT AND QUARRY readers. Questions should be addressed to Leo T. Parker, Legal Editor, PIT AND QUARRY.—Ed.]

LEGAL EDITOR: A few months ago we made a sale contract with a purchaser. We delivered the rock, but now the purchaser wants to avoid paying us because he says we violated the law, and did not pay our employees wages required by his state laws. Does this cause us to lose our money? Candel Company.

Answer: In Safe-Way v. Fuller, 51 N. E. (2d) 870, it was shown that a seller sued to recover money for merchandise delivered in accordance with terms of a contract. The purchaser attempted to avoid liability on the contention that the whole contract was rendered void because certain parts of the agreement were illegal and unlawful.

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OF HOT MIX PER HOUR
with this H&B All-Electric Portable Asphalt Plant

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Manufacturers of Portable and Stationary Asphalt Plants of all Types and Capacities.

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Although the lower court refused to hold in favor of the seller, the higher court reversed the verdict, and in holding the purchaser bound to pay the full contract price to the seller said:

"Where a contract is made up of several agreements, and one agreement or covenant is illegal, if the illegal covenant can be eliminated without destroying the symmetry of the contract as a whole, the courts will do so and enforce the remainder."

In view of the above late higher court decision, it is my opinion that you can sue the purchaser and recover full payment due you.

LEGAL EDITOR: What is the liability of a quarry company for payment of wages of the Federal Wage Law? If rock is sold outside the state, must the company abide by this law? All-Fair Company.

Answer: According to a decision rendered by a recent higher court, "local" companies, not being subject to the Fair Labor Standards Act, must prove their contentions in order to avoid adverse decisions.

For example, in Conley v. Valley Company, 139 Fed. Rep. (2d) 692, it was shown that a person was employed as a dispatcher. The employer was concededly engaged in interstate commerce. He sued the company to recover wages under the Fair Labor Standards Act.

During the trial the counsel presented an interesting argument to the effect that the company was exempt from wages specified by the Fair Labor Standards Act because the company was a "local" company.

It is interesting to observe that the higher court agreed with this argument and held the company exempt from wage and hour provisions of the Fair Labor Standards Act.

On the other hand, this decision is not one that can be depended upon in your situation. For example, if you sell rock to companies which ship it interstate you are *not* exempt from Fair Labor Standards Act. If, however, *all* the rock you carry and sell is used in the state, you are exempt.

LEGAL EDITOR: Recently, we sent one of our employees on a bus to attend to some important business for us. The bus driver agreed to let him off at a special stop and did not do so. On account of the delay we lost several hundred dollars. Can we sue and get damages from the bus company? Little Sand and Gravel Company.

Answer: Various modern higher courts have consistently held that a bus operator is a special agent, and the company is not liable for special agreement, or promises made by the operator to passengers.

For illustration, in Dixie, 187 So. 508, it was disclosed that a passenger boarded a bus and asked the driver to let him get off at a point different from that specified in the ticket. In subsequent litigation involving letting him off, at a wrong stop, the higher court held the company not liable, and said:

"It has been repeatedly held that a conductor is without authority to agree with a passenger to carry him to a particular place and allow him to lease and thus bind the company as to a destination other than called for in the ticket. If the conductor makes a promise which he is not authorized to make, the company is not liable."

Therefore, you cannot recover damages from the bus company.

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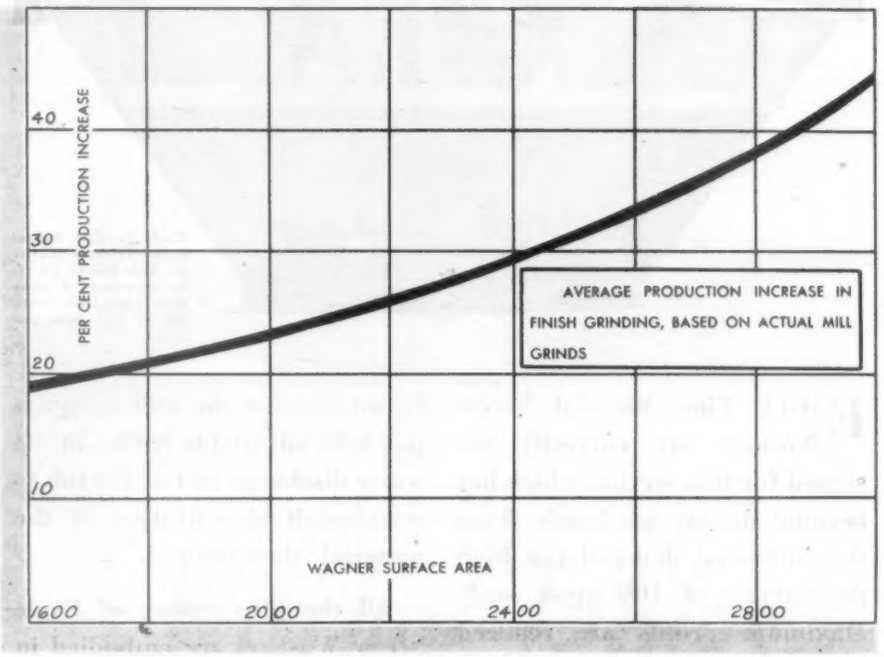
GRINDING COSTS DOWN
with **TDA**

That's why over 50% of U. S. cement plants use TDA



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TDA is a catalyst-dispersing-agent used as a grinding aid. Used in amounts of 1½ to 4 oz. per barrel of cement, it not only increases production, but its presence improves many of the important properties of concrete, such as durability, strength, and impermeability.

TDA is being increasingly used to keep down grinding costs. On the chart you can find the average production increase in finish grinding which operators are obtaining in actual mill grinds. Some use TDA for special fine grinds, and others use TDA when bottlenecks occur in the finish grinding departments. TDA is widely used in making high early strength cements. And many plants use TDA in all their cement.

TDA is *not* an air-entraining agent, but gives increased durability to concrete where freezing and thawing in the presence of calcium chloride is not a factor.

You can use TDA with confidence. It is approved for use in cement and has been field-tested in over one hundred million barrels of portland cement.

Our engineers will be glad to work with you in making trial runs in your own plant. Write to the Cement Division of the Dewey and Almy Chemical Company, 65 Whittemore Avenue, Cambridge 40, Massachusetts.

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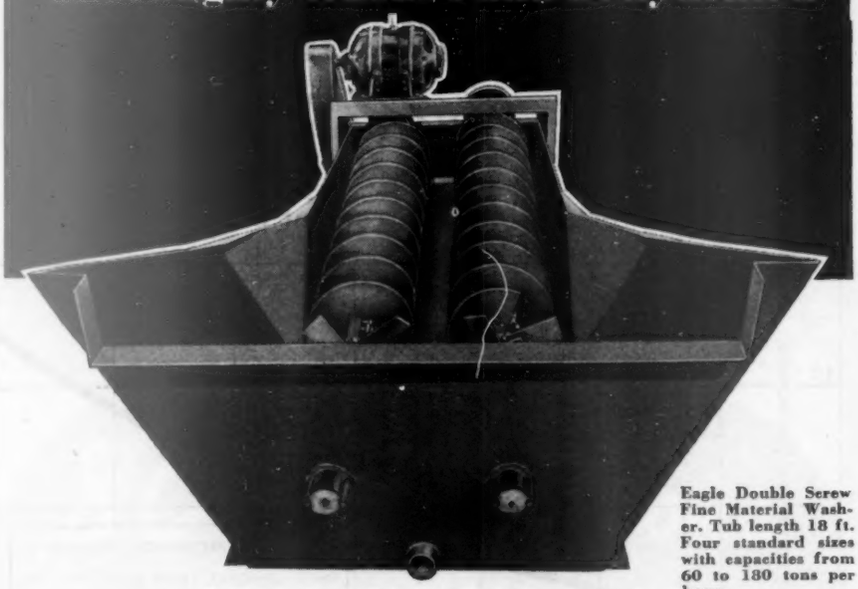

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EAGLE Fine Material Screw Washers are correctly designed for this service, which has become doubly profitable from the increased demand for high percentages of 100 mesh sand. Maximum profits are realized when fine materials are washed in an Eagle Unit.

These Eagle washers have a long tub—18 ft. is standard—to assure complete dehydrating of fine materials. A flared tub to give a larger settling basin for the retension of fines is also standard.

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All the plus values of Eagle Screw Washers are embodied in these fine material washers . . . *more thorough scrubbing . . . controlled, concentrated water volume . . . high continuous capacity . . . longer screw life . . . wear-proof bearings..... no dead zones in tank . . . starts after shutdown without unloading . . . provides closed circuit without elevator . . . low power requirement.*

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Eagle Single Screw Fine Material Washer.

Tub length 18 ft. Five standard sizes with capacities from 30 to 85 tons per hour.

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EAGLE *Specialized Sand and Gravel Equipment*
"SWINTEK" DREDGE LADDERS — SCREW WASHERS
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TRAFFIC News Digest

CENTRAL FREIGHT ASSOCIATION

Docket 78377 (2).—Stone, crushed or screenings, carload minimum weight 90 per cent. of marked capacity of car, except that when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Hillsville, Walford and Shaw Junction, Pa., to Conifer, Pa., 154 cents net ton.

Docket 78379 (2). — Limestone, ground or pulverized, unburned, carload minimum weight 60,000 pounds. Establish on, from Piqua, O., to Newark and Salem, N. J., 413 cents net ton.

Docket 78387 (2).—Clay, crude common or fire, carload, minimum weight 60,000 pounds. Establish on, from Bloomingdale, Brazil, Hillsdale, Hollowell, Mecca, Melcher and Montezuma, Ind., to Hobart, Ind., 168 cents per net ton.

Docket 78398 (2).—Stone, crushed in bulk in open-top cars, carload minimum weight 90 per cent. of marked capacity of car, except that when cars are loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Speed, Ind., to Memphis, Ind., Sienna, Ind., Scottsburg, Ind., 66 cents; Rockford and Jonesville, Ind., 83 cents; Walesboro and Taylorsville, Ind., 88 cents; Amity and Franklin, Ind., 99 cents; Whiteland and Greenwood, Ind., 105 cents; Southport and Indianapolis, Ind., 110 cents per net ton.

Docket 78425 (2).—Crushed stone; crushed stone screenings; crushed stone tailings; loaded in open-top cars only, carload minimum weight 90 per cent. of marked capacity of car except that when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Rimer, O., to Hicksville, O., 110 cents per net ton.

Docket 78426 (1).—Limestone, agricultural, unburned, in bulk, in open-top cars, carload minimum weight 90 per cent. of marked capacity of car, except that when loaded to full cubical or visible capacity, actual weight will apply. Establish rates as shown in Exhibit A (not shown) from Speed, Ind., to points on the B. & O. railroad.

ILLINOIS FREIGHT ASSOCIATION DOCKET

Docket IRC-511-299.—Sand (except naturally bonded, moulding, ground or pulverized sand) in open-top equipment, minimum weight 90 per cent. of marked capacity of car, except that when car is loaded to full visible or cubical capacity, actual weight will apply, but orders will not be accepted for cars of less than 80,000 pounds, when in open-top equipment, from Essex, Ill., to Havana, Ill. Present—Class or combination rate. Proposed—$1.35 per net ton.

Docket IRC 511-302. (M.R.P. IRC 4019).—Stone, broken, crushed or ground, carload minimum weight 90 per cent. of capacity of car, except that when car is loaded to capacity, actual weight, but not less than 40,000 pounds, will apply, to Williams Bay and Bassetts, Wis. Present rates—Combination commodity rates to Crystal Lake, Ill., class rates beyond. Proposed rates—per net

ton from Alton, Ill., $2.50; from Cannon, Mo., $2.55; from Hannibal, Mo., $2.35; from Louisiana, Mo., $2.35; from Marblehead, Ill., $2.35; from Quincy, Ill., $2.35; from White Bear, Mo., $2.35.

Docket IRC 511-303.—Agricultural limestone, in open-top cars, carload minimum weight 90 per cent. of marked capacity of car, except that when cars are loaded to full capacity, actual weight will apply, but not less than 60,000 pounds, from Rivermines, Mo., to I.C. railroad stations, viz.:

	Per Ton of 2,000 Pounds Proposed
New Athens, Pyatts, Pickneyville	$1.00
Belleville, Murphysboro, Christopher, Benton, DeSoto	1.05
Gorham, Ashley	1.10
Zeigler, West Frankfort, Herrin, Marion, Anna, Ware, Sandoval, Shobonier, Odin.	1.15
Vandalia, Kinmundy	1.20
Eldorado, Ullin, Villa Ridge, Parker, Simpson, Gale	1.23
Cairo - Mounds, Metropolis, Edgewood, Effingham	1.30
Golconda	1.32

DOCKET AND STATUS REPORT OF PRIOR SOUTHERN FREIGHT ASSOCIATION SUBMITTALS

Docket 33517 (shipper; suggested by carrier).—Establish joint through commodity rates on ground limestone, carload in cents per ton, 2,000 pounds, to Malden, Mass., from Cartersville, Ga., 735 cents, from Sparta, Tenn., 740 cents.

Docket 33553 (shipper; suggested by carrier). Carriers propose to reduce through minimum rate to 353 cents per ton 2,000 pounds, published in item 105-B of Georgia R.R. I.C.C. A-186, in connection with proportional rate of 298 cents per ton, 2,000 pounds, on crushed stone, carload, Lithonia and Stone Mountain, Ga., to E. St. Louis, Ill., and St. Louis, Mo., applicable when to points in W.T.L. territory.

Docket 33565 (shipper; suggested by carrier).—Publish rate of 229 cents per ton of 2,000 pounds on lime, carload minimum 50,000 pounds, from Reddick, Fla., to Water Works Spur (near Tampa), Fla.

SOUTHWESTERN FREIGHT BUREAU DOCKET

Docket 36855 (1).—Silica sand, Festus, Crystal City and Sand Pit, Mo., to Dallas, Tex., routing. To establish a rate of $3.10 per net ton on silica sand, carload, from Festus, Crystal City and Sand Pit, Mo., to Dallas, Tex.

Docket 36912 (2).—Gypsum-crude or crushed, Blue Rapids, Kansas, to Nashville and Cowan, Tenn. To establish on gypsum, crude or crushed (not ground), in bulk, minimum weight 80,000 pounds, in carloads, from Blue Rapids, Kansas, to Nashville, Tenn., a rate of 460 cents and to Cowan, Tenn., a rate of 500 cents, in lieu of the present rates of 840 and 900 cents per ton, 2,000 pounds, respectively.

Docket 36929 (1).—Silica sand, Portage, Wis., to Dallas, Tex. To establish rate of $3.50 per ton on silica sand, carloads, from Portage, Wis., to Dallas, Tex.

Docket 36951 (2).—Ground or pulverized limestone, Carthage, Mo., to Kansas City, Mo. To establish rate of $1.38 per ton of 2,000 pounds on ground or pulverized limestone in bulk or in bags or in barrels in box cars or covered hopper cars from Carthage, Mo., to Kansas City, Mo.

Docket 36964 (1).—Lime, Limedale Spur, Ark., to Arkansas City, Kan. To establish rate of 17 cents per 100 pounds for application on lime, viz.: lump, crushed, pulverized or hydrated, in straight or mixed carloads, minimum weight 50,000 pounds, from Limedale Spur, Ark., to Arkansas City, Kansas, the 17 cent rate to be applied as a maximum from and to intermediate points.

Docket 37029 (2).—Agricultural limestone, Rivermines, Mo., to Reed, Ky. To establish rate of $1.50 per ton of 2,000 pounds on limestone, agricultural, in open-top cars, carloads, minimum weight as per Item 300-D of SFTB Tariff 388-F, I.C.C.-840, from Rivermines, Mo., to Reed, Ky.

Docket 36999 (1).—Cement, also dry building mortar, interstate points to New Mexico. To provide rates on cement and dry building mortar to New Mexico points on the A. T. & S. F. shown below based following arbitraries over the present rates to Farwell, Texas:

Clovis	2 cents
Gallagher	3 cents
Cameo	3 cents
Grier, St. Vrain	4 cents
Melrose, Portales	5 cents
Texico	Same rate as to Farwell, Tex.

Docket 37012 (2).—Limestone, Woodville, O., to Festus-Crystal City, Mo. To establish rate of $3.83 per ton of 2,000 pounds on limestone, unburned, agricultural, ground or pulverized, in box cars, carload, from Woodville, O., to Festus-Crystal City, Mo.

TRUNK LINE ASSOCIATION DOCKET

Docket 42994 (shipper). — Slag, unsuitable for further extraction of metals, carload minimum weight 90 per cent. of

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BEST FITS YOUR NEEDS?

1. Before or after flotation for recovery of coarse mineral not readily susceptible to flotation.
2. For separations (or grading up) from previous table concentration or from original table feed.
3. For concentrating low grade feeds to produce high grade concentrate for chemical treatment and tailings.
4. For concentrating a middlings feed producing a high grade concentrate and a middlings for regrinding.

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Other Mine and Smelter Products:
Marcy Ball, Rod & Tube Mills; Rock Bit Grinders; Pinch Valves; Belt Feeders; Density Controllers; Assay & Lab. Eqpt. & Supplies; Mine & Mill Supplies; Complete Milling Plants.

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SALT LAKE CITY
EL PASO
NEW YORK CITY

The Mine & Smelter Supply Co.

CANADIAN
VICKERS, LTD.
MONTREAL
W. R. JUDSON
SANTIAGO, LIMA

marked capacity of car, etc., from Baltimore, Md., stations and Sparrows Point, Md., to Harrisonburg, Va., $1.87 per net ton, in lieu of present 6th class rates. Reasons: Comparable with rates from and to other points.

Docket 43000 (shippers).—Crushed stone and screenings, in straight or mixed carloads (will not include agricultural limestone or ground limestone, unburned, fluxing stone or firestone; or stone coated with oil, tar or asphaltum), minimum weight 90 per cent. of marked capacity of car, etc., from Texas, Md., to Hampton, Va., $2.20 per net ton, in lieu of present 6th class rate of 25 cents per 100 pounds. Reason—Comparable with rates applying from and to other points.

Docket M-4834 (shipper).—To establish rates on ground or pulverized unburned limestone from Universal, Mifflin Jct. and Bessemer, Pa., to destinations in Maryland, West Virginia and Pennsylvania on basis of the Carriers' Revised Scale, I.C.C. Docket 25220. Reason: Comparable with rates applying from and to other points.

Docket 43002 (shippers).—Limestone, crude, fluxing, foundry and furnace, in open-top equipment, carloads, minimum weight 90 per cent. of marked capacity of cars, etc., from White Pigment Corporation Siding, Pa., to Rambo, Pa., $1.14 per gross ton, in lieu of current 6th class rate of 17 cents per 100 pounds. Reason: Comparable with rates applying from and to other points in immediate vicinity.

Docket 43015 (shipper). — Dolomite, roasted (refractory dolomite in granular form, treated or untreated, clinkered, or burned to a dead state), minimum weight 80,000 pounds from Marelan, P. Q., to Philadelphia, Pa., for export, 28 cents per 100 pounds, in lieu of present 6th class rate of 42 cents. Reason: Comparable with rates applying to other points.

Docket 43017 (shippers).—Stone, natural, viz.: Granules, roofing, made from burned shale or crushed or ground brick, minimum weight 50,000 pounds, from Watsontown, Pa., to Verona, Pa., $3.52 per net ton, in lieu of present 6th class rate of 24 cents per 100 pounds. Reason: Comparable with rates applying to other points.

Docket 43022 (shipper). — Limestone, ground or pulverized, carload minimum weight 60,000 pounds, from Oriskany Falls, N. Y., to Lockwood, N. Y., $1.82 per net ton, in lieu of present 6th class rate. Reason: Comparable with rates applying from and to other points.

WESTERN TRUNK LINE NEW APPLICATIONS

Docket D-11-113.—Cement, carload from Mason City, Ia., to Platteville, Wis. Proposed—16 cents via route of the C.M.ST.P.&P. direct.

Docket E-41-683. — Stone, broken, crushed or ground, carload minimum weight 90 per cent. of marked capacity of car, but not less than 50,000 pounds, from Morton, Minn., to Council Bluffs, Ia., and Omaha, Neb. Proposed — 12 cents per 100 pounds.

Docket E-41-684. — Stone, broken, crushed or ground, carload minimum weight 90 per cent. of marked capacity of car, but not less than 50,000 pounds, from Morton, Minn., to Sioux City, Ia. Proposed—9½ cents per 100 pounds.

Docket E-41-688. — Silica sand, carload from Portage, Wis., to Dallas, Tex. Proposed—$3.59 per ton. (By shipper.)

Docket E-41-689. — Stone, broken, crushed or ground, carload minimum weight 90 per cent. of marked capacity of car, but not less than 50,000 pounds. From Morton, Minn., to Kansas City, Mo. Proposed—16 cents per 100 pounds.

Docket E-41-690.—Sand, carload, as described in Item 8070, W.T.L. tariff, 111—L from Manley, Wis., to Missouri River points. Proposed—38 cents per 100 pounds. (By shipper.)

Docket X-E-43-194.—Gypsum, crude or crushed (not ground), in bulk, carload minimum weight 80,000 pounds, from Blue Rapids, Kans., to North Chattanooga, Tenn. Present—Combination rates apply. Proposed—$5.20 per ton of 2,000 pounds (Scale for 885 miles). (By shipper.)

Docket E-41-685. — Agricultural limestone, carload, from Inland, Michigan, to stations in Michigan on the C.&N.W., C.M.ST.P.&P., C.R., D.S.S.&A., E.&L.S., L.S.&I., M.&L.S. and M.R. railways or railroads. Proposed—In cents per net ton of 2,000 pounds.

Distance	*Rate*	*Distance*	*Rate*
100 miles	130	240 miles	160
130 miles	130	350 miles	170
180 miles	140	500 miles	190

Docket E-41-692. — Stone, broken, crushed or ground, carload minimum weight—90 per cent. of marked capacity of car, but not less than 50,000 pounds. From Morton, Minn., to Fremont, Lincoln and Grand Island, Neb. Rates—present—class or combination rates. Proposed—Fremont, $2.75 per ton of 2,000 pounds; Lincoln, $2.97 per ton of 2,000 pounds; Grand Island, $3.30 per ton of 2,000 pounds. (By shipper.)

Docket X-E-41-693.—Sand and gravel, carload minimum weight marked capacity of car. From Denver, Colo., to Brownson and Huntsman, Neb. Rates—present—class or combination rates apply. Proposed 174 cents per ton of 2,000 pounds.

Here's the quick, easy, money-saving way to replace them, right on the job

The hub and spokes on drive sprocket and idler rims usually are still in good condition when the teeth and outer rim are worn out. When that time comes, the modern method is to match a Pacific Manganese Renewable Rim over the worn rim, as shown above; the spokes are torched through; and the new rim is positioned and welded on. . . . Any experienced welder can do this work quickly, right on the job if desired. . . . The result is a better rim because the tough, wear-resistant Manganese Steel Rim will last longer, and by salvaging the hub and spokes you have made a substantial saving in money.

PACIFIC MANGANESE Renewable DRIVE SPROCKET RIMS and IDLER WHEEL RIMS

For Caterpillar "Track Type" Tractors

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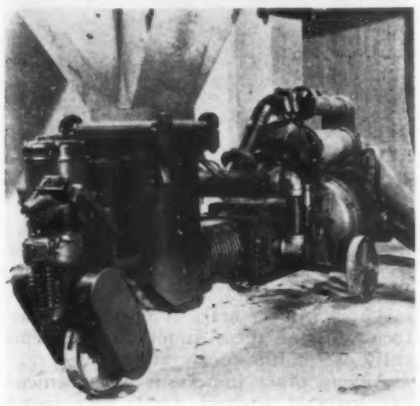
Manufacturers of PACIFIC SLUSHING SCRAPERS & SHEAVE BLOCKS • PACIFIC CRUSHING & SCREENING UNITS • PACIFIC ROCK BIT GRINDERS • PACIFIC ALLOY-MANGANESE MILL LINERS & CRUSHER JAWS • PACIFIC TRACTOR RIMS, CRAWLER SHOES & Wearing Parts

NEW MACHINERY and SUPPLIES

● Cement Pump

The Fuller-Kinyon Trackless-Portable pump, adaptable for conveying finished Portland cement from bins and silos to packers, is not limited to the handling of cement but can be applied to conveying many other types of dry pulverized materials. It also makes an ideal replacement unit for obsolete mechanical conveyors, the manufacturers claim.

The pump operates on the same principle as other types of Fuller-Kinyon



Pump can be applied to many pulverized materials.

pumps. It can be moved together with its motor, under its own power, from one point of discharge to another. Connection to silos reportedly can be made without dust or loss of material.

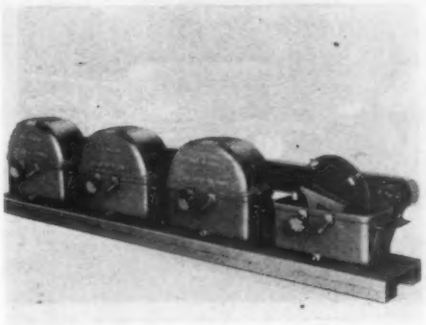
A cable of sufficient length is furnished with each machine for connecting to power outlets, spaced at proper intervals. Forward and reverse propulsion is by means of a gearmotor, controlled from push buttons mounted near the steering handle at the front of the machine.

● Feeder for Liquids

The Denver Equipment Company has developed a new multicompartment feeder which is a compact unit with simple but accurate means of adjustment. Each compartment is identical, in construction and operation, to the single compartment unit developed by Denver Equipment Company. Several compartments are driven by a single motor through a sprocket-and-chain drive.

Each of the compartments may be regulated independently. Feeder cups are bolted to a plate steel disc. The size and number of cups used may be changed to vary the maximum feeder capacity. A convenient handwheel provides quick, "micrometer" adjustment of feed rate. The same liquid may be fed from each compartment to different points in the circuit, or different liquids may be distributed to the same or different points in the circuit.

The Denver feeders are available in three sizes, each of which is made in simplex, duplex and multicompartment units. Special feeders for handling corrosive liquids and those which require heating to maintain uniform viscosity are made to meet the conditions of each individual problem.



Each compartment may be regulated independently.

● Turbocharging

Claimed for Enterprise turbocharging by the Enterprise Engine & Foundry Company are the following advantages—more power per cubic inch of displacement, more power per pound of engine weight, more power per square foot of floor space, greater fuel economy, greater overload capacity, cleaner engine performance, and sea-level performance at high altitudes. The "more power and less fuel" combination of the Enterprise Turbocharged Diesel engines, say the manufacturers, results from the introduction of more air into the cylinders, per-

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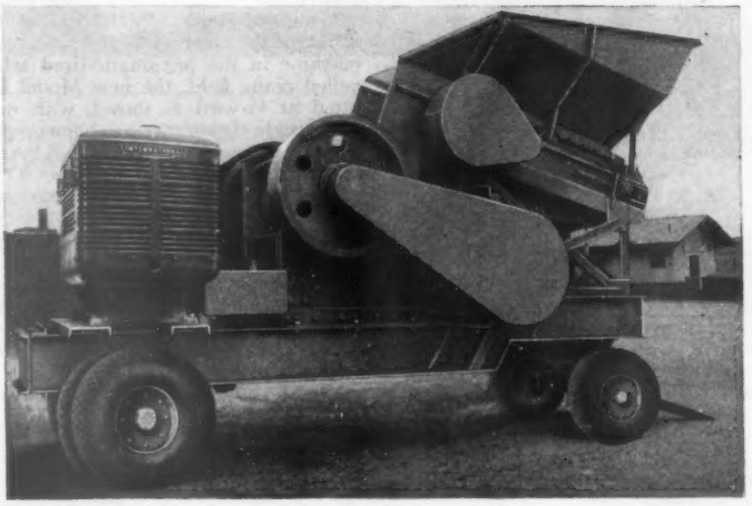
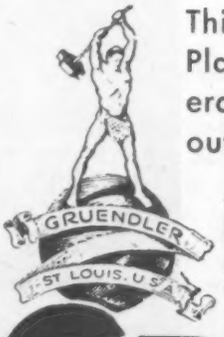
A Primary Crushing Unit developed to meet the increasing demand for every new plant and to step up production in your present plants



So easily moved from job to job



This big capacity Portable Rock Crushing Plant is fast becoming the choice of operators who demand more tons per hour output of uniformly crushed aggregate.

Manufacturers of

PRIMARY and SECONDARY HAMMERMILLS—Complete ROCK and GRAVEL CRUSHING SCREENING and CONVEYING EQUIPMENT

Write for Illustrated Bulletins

GRUENDLER

CRUSHER and PULVERIZER CO. • ST. LOUIS 6, MISSOURI

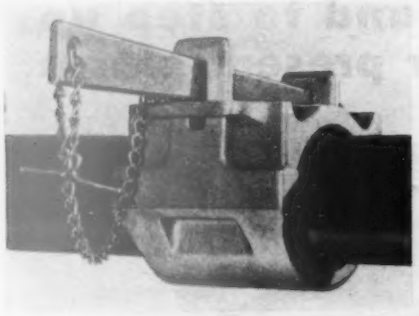
mitting the burning of larger quantities of fuel. "Thus, with the same cubic inch displacement as non-supercharge engines, without appreciable increase in weight or increase in floor space requirements, Turbocharged Enterprise Diesels develop 150 per cent. more power than non-turbocharged Diesels.".

● Pipe Couplings

Faster coupling of pipe at lower cost and with greater flexibility is claimed by Drinkwater, Inc., of Chicago, for a new line of flexible pipe couplings known as Drinkwater Presto-Lock couplings, made in 11 sizes, from 1¼-inch to 16-inch.

The couplings can be used with any plain end pipe without threads, grooves or flanges. No wrenches or special tools of any kind are required in assembly. Only a hammer is needed to tighten wedge keys after the two sections are fitted over pipe ends and wedge keys have been inserted in the key channels. The procedure, according to the manufacturer, is so simple that even the most inexperienced workmen can assemble Presto-Lock couplings in a matter of seconds.

The three simple parts of Presto-Lock flexible couplings are the two corrosion-resistant malleable iron castings and the



Quick-locking wedge key tightens coupling.

quick-locking wedge key. Sizes 1¼-inch, 1½-inch 2-inch, 2½-inch and 3-inch are equipped with one wedge key and chain assembly to prevent loss of coupling parts. Sizes 3-inch to 16-inch have two wedge keys but no chain assembly. The gaskets which are used on all Drinkwater Presto-Lock couplings have been specially designed to effect a permanently tight seal on all types of pipe lines. Three types of gaskets are available, synthetic rubber, neoprene and natural rubber. Actual tests by the manufacturer show that Presto-Lock flexible pipe couplings give up to 40-degree flexibility at each joint, acting as a sleeve, elbow and ball union.

● Flooring Material

Plant superintendents will be interested in Stonoleum, a flooring featured by the Continental Asbestos & Refining Corporation of New York. It is claimed that Stonoleum can be applied directly over old concrete and practically any other sub floor. Because of a special colloidal composition it is highly resistant to vibration, impact and the wear and tear of traffic. The manufacturers state that Stonoleum is "self-healing", that if a nail is driven into it and then withdrawn, traffic will cause it to coalesce and fill the hole.

● Versatile Shovel

The Type 10 Model 105, latest development in pneumatic-tired combination crane-shovel-dragline equipment by the General Excavator Company of Marion, Ohio, has been formally "unveiled" after a series of exhaustive road and performance tests.

Compactly-built "welterweight" offspring of the General Supercrane, pioneer machine in the pneumatic-tired self-propelled crane field, the new Model 105 is rated at ½-yard as shovel, with quickly convertible front-end attachments for a complete range of construction, excavating and materials-handling jobs. Optionally equipped with either four or six 10.00 x 20 tires, or with 14.00 x 20 rib tread tires for off-the-road service, and featuring air booster steering, the new rig is capable of highway cruising speeds of more than 20 miles per hour. It conforms to major highway regulations and in most states needs no permit to travel over the roads.

On the job, the Model 105 is said to

Unit can cruise at more than 20 miles per hour.

revolutionize present standards of mobility and versatility. Fully independent travel, swing and boom at the finger touch of a lever make it possible to perform any of these functions independently or simultaneously at will.

Among other important advancements are optional 4-wheel drive; four speeds forward and reverse; easily accessible independent assemblies; self-counterweighting machinery; heavy-duty engine, transmission and clutches.

● Protective Equipment

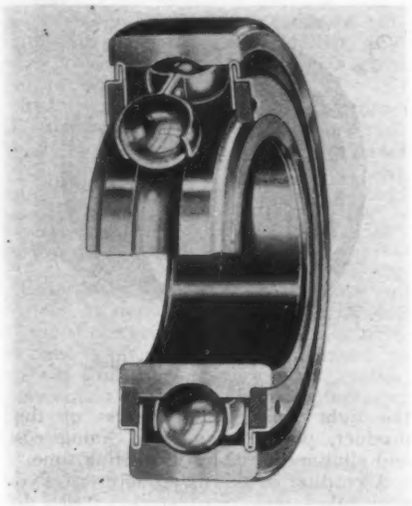
A variety of appliances featured by the General Scientific Equipment Company of Philadelphia includes the Supergard (finger guard), a special sweat band, goggles, eyeshields, respirators and various protective equipment made of rubber. For face protection three types of goggles are offered — "Optiguard"

The Baughman Manufacturing Company, Inc., Jerseyville, Illinois, maker of distributor truck bodies for agricultural limestone and similar products, also makes several types of unloaders. One, the Model "J" (left), is used for transferring materials over long hauls and is useful in getting more work out of smaller units. The other, the Model "L" and "M" (right), operates with a gasoline engine.

welder's, chipper's and grinder's. Jackson eyeshields and dust hoods of several styles and Watchemoket Eye Savers, fitted with Plexiglas, are supplied for numerous special uses. One type of acid goggles (Cover's "Dupor") made of rubber has water in a patented groove which washes off fog when the head is nodded.

● Sealed Bearings

Three more new developments announced by New Departure Division, General Motors Corporation, Bristol, Connecticut, mark additional improvements in sealed ball bearings. The first

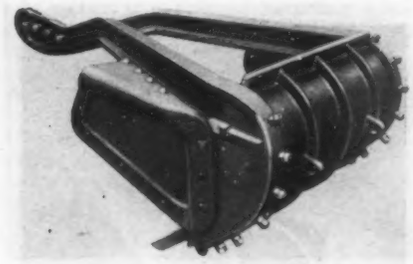


Seal is adapted to range of operating conditions.

of these is a new and more efficient seal, adapted to a wider range of operating conditions; the second, a method for revitalizing the lubricant in the bearing; the third, a new series of self-sealed ball bearings specifically designed for dirt exclusion and lubricant retention.

● Scraper Buckets

The American Manganese Steel Division of American Brake Shoe Company announces a new line of manganese steel scraper buckets. Made in two types, the ¼-cubic-yard and ¾-cubic-yard boxes, these scrapers feature high capacity, all manganese steel construction, simplicity of design, readily renewable



Units feature all manganese steel construction.

scraper blades, curved back and proper balance. The curved back, it is reported, aids in quickly "rolling up" capacity loads.

The ¼-cubic-yard box bucket is 30 inches wide and made with sides cast integrally with the back. A wearing shoe protects the bail against abrasion wear. The ¾-cubic-yard box bucket is 66 inches wide, 72 inches long overall, and

A big mouthful with every bite
In dirt, clay, coal, gravel or ore you can rely on one of the tough, properly designed, Brownhoist buckets to take a full load with every bite. Extra large sheaves reduce rope wear to a minimum. Brownhoist Buckets are available in rope-reeve, power-wheel and link type. For prices and further facts write INDUSTRIAL BROWNHOIST CORPORATION, Bay City, Michigan. Offices in New York, Philadelphia, Pittsburgh, Cleveland and Chicago.
BROWNHOIST BUCKETS
GIVE MORE YEARS OF
TROUBLE-FREE PERFORMANCE

You have no outboard bearing problem in rigging up a power take-off when the power unit is a Wisconsin Air-Cooled Engine. All Wisconsin Air-Cooled Engines are equipped with an extended shaft, which is an integral part of the crankshaft proper. Drive pulley, sprocket, gear drive or direct-connected coupling can be attached directly to this extended crankshaft . . . because all Wisconsin Air-Cooled Engines are equipped with *tapered* Roller Bearings at both ends of the crankshaft to take up end-thrust and carry the power load.

This is a feature frequently overlooked by the purchaser of an engine . . . but it is NOT overlooked in the manufacture of Wisconsin Engines . . . built for efficiency and dependable service in *all* ways.

Most H.P. per pound
WISCONSIN MOTOR
Corporation
MILWAUKEE 14, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

SAUERMAN
Long Range Machines

Explanation of Picture — The above picture of a small Sauerman Scraper digging gravel from pit and delivering to crushing plant shows the simple effectiveness of this method. This particular size of Sauerman machine consumes 4½ gals. of gasoline to move 45 cu. yd. of material per hour.

Dig, Haul and Dump for a few cents a yard

JOBS of stockpiling or of digging from pits, ponds and banks are simplified by using a Sauerman Power Scraper or Cableway.

This equipment is very flexible and is readily adapted to any ground conditions. First cost is reasonable, maintenance expense is small and the simplicity of operation permits easy one-man control of even the largest Sauerman installation.

There is a size and type of Sauerman machine to meet every capacity requirement from ten cubic yards an hour to many thousand cubic yards a day. And each machine, large or small, offers greatest possible economy of power and labor in its appointed task.

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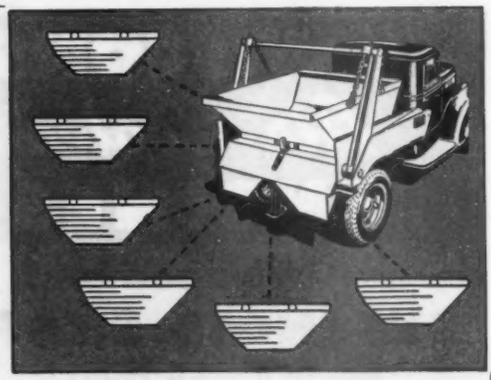
Super-System of Material Handling

FASTER
EASIER
BETTER



BROOKS LOAD LUGGER
with Detachable Buckets

for

LOADING
HAULING
DUMPING

It takes only ONE Load Lugger, mounted on a truck chassis, to service from 5 to 10 *bodies* or dump buckets . . . hauling them away while the workmen are filling the others, conveniently spotted on the job. This method cuts costs on your material handling contracts . . . saving time, conserving manpower and reducing maintenance expense. It helps beat the truck shortage because a Load Lugger and set of buckets can handle as much per day as a fleet of ordinary trucks.

Ask for Catalog No. 44

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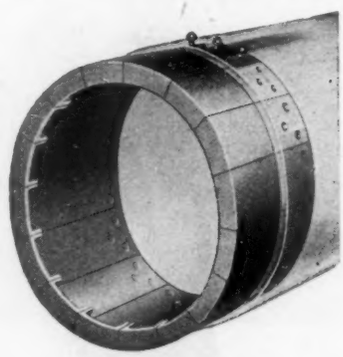
Distributors in All Principal Cities

Brooks EQUIPMENT AND MFG. CO.

has removable 33-inch-long side plates. Wearing runners on the pulling bail afford protection against abrasive wear.

● Kiln Ends

The Chicago Steel Foundry Company, manufacturers of Pyrasteel kiln ends, report that savings as high as 10 tons of coal per day have been recorded by operators after equipping their rotary kilns with Pyrasteel kiln ends. They claim that such savings are due to reduction in heat losses, made possible by



Tight seal conserves fuel.

the tight sealing effectiveness of their product, plus economies in lining costs and elimination of lost operating time.

According to the manufacturers, Pyrasteel takes into consideration "the difference in the coefficient of expansion between the ordinary carbon steel, of which the kiln is constructed, and the relatively slow expansion of the heat-resisting alloy." Pyrasteel segments, they explain, permit the natural expansion of the kiln proper, but prevent the lining from spilling out because they are held together at the discharge end. They are made to fit kilns of any diameter.

● Welding Electrode

A new heavily covered arc-welding electrode for flat and horizontal fillet welding as well as for flat butt welding has been announced by the Electric Welding Division of the General Electric Company. Desirable wherever weld requirements include high mechanical properties, rigid X-ray examination, good

Electrode requires low heat input to joint.

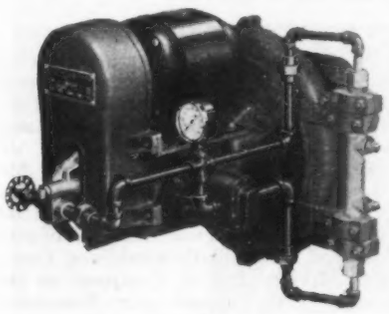
profile, high deposition rate, and good surface appearance, the applications of this electrode include pressure vessels and pertinent connections, heavy machine bases, and structural parts such as column plates, columns, roof trusses, beams, and girders where the thickness of the section permits.

Known as Type W-27, the new electrode is said to have an exceptionally high melting rate, which results in increased production and higher speeds at the same welding current as other electrodes. At comparable production speeds, General Electric claims, Type W-27 requires less heat input to the joint, thus reducing warpage and internal cooling stresses. These features, plus its ability to operate through a wide range of current, and freedom from undercut, suggest the use of Type W-27 for a great many production tasks.

Readily recognized by its steady, forceful, spray-type arc, the new electrode operates on alternating current or direct current with either straight or reverse polarity. It has low spatter loss and easy slag removal.

● Versatile Oil Burner

Enterprise industrial-type rotary oil burners, as described in a recent catalog of the Enterprise Oil Burner Company of San Francisco, may be arranged to operate from a wide variety of combustion control systems. The manufacturers



Burner is suitable for kilns.

state that they may also be used for operation in conjunction with a stack damper. Although the low-pressure system is the chief means of regulation, high-pressure controls may be used in installations having the fuel supply throttled.

These semi-automatic and manually-controlled Enterprise burners are practically suited, it is claimed, to rotary kilns and dryers. The burners with built-in pumps are made in 11 sizes, with capacities from 4 to 100 gallons of oil per hour. Burners for gravity flow or for fuel supply from separate pump sets come in 11 sizes for V-belt or direct-drive, and in two sizes in direct-drive with capacities up to 200 gallons of oil per hour.

● Loading Device

The Truk-Loder, a utility loading device, is said by its makers, the Truk-Loder Company, Tiffin, Ohio, to be capable of scooping, hoisting and loading, performing the work of several men with hand tools. Designed as an independent unit, the Truk-Loder is attached to any kind of truck by means of two 1-inch bolts. It is said to be useful in handling poles, sewer pipes, dirt, gravel, snow, refuse and many other kinds of loads. Its scoop is operated by the driver, the power being supplied by the momentum of the

May be attached to any kind of truck.

truck. Trucks can be loaded from the side or from the rear.

● Mobile Crane

Because it can work both inside warehouses and factories and on outside storage lots with rough and uneven surfaces, the Hyster Karry Krane (below), a 10,000-pound-capacity mobile crane built by the Hyster Company of Portland, Oregon, and Peoria, Illinois, is termed an all-purpose unit by its manufacturers.

On docks and in warehouses, aboard ship, in forge shops, foundries, railroad yards and in many manufacturing firms the Karry Krane fits into high-speed materials-handling programs.

Unit handles loads up to 10,000 pounds.

NOT *One* FAILURE *in a million!*

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. . . that's a pretty good record but it is the one established by our chrome-nickel alloy ROPE SOCKETS.

★

Yes, we have been making them for 36 years without a single recorded failure.

★

Take a lesson from experience, and specify . . . EVANSTEEL Rope Sockets. They are stronger, lighter, and cost less.

CHICAGO STEEL FOUNDRY COMPANY

PYRASTEEL for high temperatures

KEDZIE AVE & 37TH ST. CHICAGO 32, ILL. Makers of Alloy Steel for 30 Years

EVANSTEEL for strength

LUBRIPLATE No. 130-A

LUBRICATION PLUS!

A SUPER LUBRICANT—A MARVELOUS ANTI-SEIZE COMPOUND—A REAL PROTECTION AGAINST RUST AND CORROSION. From the standpoints of general utility and wide diversity of important uses, we do not believe there has ever been a lubricant that compares with LUBRIPLATE No. 130-A. It has everything. The outstanding performance of this super-lubricant and its adoption by industry in general, and the Army and Navy are certainly adequate proof of its superiority. Write for copy of bulletin No. 6-41.

LUBRIPLATE

Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

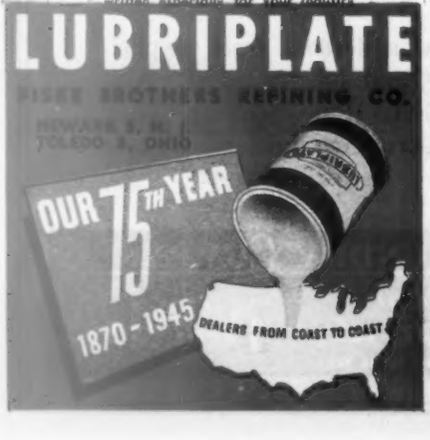
LUBRIPLATE

Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

LUBRIPLATE

Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.

Write for a booklet, "The LUBRIPLATE Film" written especially for your industry



TRADE NOTES

A. G. Bussmann and L. D. Granger were elected vice-presidents of the Wickwire Spencer Metallurgical Corporation by the firm's board of directors. Mr. Bussmann is also vice-president in charge of sales of Wickwire. He has been associated with the company since 1930 in various sales and administrative positions.

Mr. Granger, prominent steel metallurgist and engineer, has previously been assistant to the executive vice-president of the Wickwire Spencer Metallurgical Corporation. He is also vice-president of the American Wire Fabrics Corporation, another Wickwire Spencer subsidiary.

M. J. Sasgen

Michael J. Sasgen, 72, for many years a leading Chicago manufacturer of industrial equipment and tools, died on July 27. Mr. Sasgen was the founder and president of the Sasgen Derrick Company, and the Grand Specialties Company. A nationally known inventor and engineer, Mr. Sasgen developed many of the machines and tools now manufactured by his companies.

In a recent address before the New York Society of Security Analysts, E. R. Galvin, president of the Tyson Bearing Corporation, Massillon, Ohio, outlined the prospects for the construction machinery industry during the ten years following the war's end. The address has been published by the Tyson Bearing Corporation and is available to key personnel throughout industry.

According to Mr. Galvin, these major factors contribute to a bright outlook for the construction machinery industry: important improvements in equipment resulting from intensive military use of construction machinery; greatly expanded foreign markets; the vast backlog of road construction work that has accumulated during the war; the shortage of road machinery equipment; American competitive advantage through control of patents, a domestic demand that warrants volume production; the absence of reconversion problems; the existence of adequate merchandising outlets and factory-trained service manpower.

J. De Kiep

Electric Machinery Manufacturing Company of Minneapolis has announced the recent appointment of James De Kiep as chief engineer in charge of electrical and mechanical design and development. Mr. De Kiep was formerly manager of the a.c. motor engineering department at Westinghouse Electric Corporation, East Pittsburgh.

R. F. Nelson

R. G. LeTourneau, Inc., Peoria, Illinois, announces the addition of Robert F. Nelson to its executive staff as vice-president and assistant to the president, R. G. LeTourneau. Mr. Nelson, former vice-president and director of the Arma Corporation, Brooklyn, New York, will work closely with Denn M. Burgess, executive vice-president, and Merle R. Yontz, vice-president and treasurer. One of Mr. Nelson's first assignments will be to assist in establishing a new LeTourneau plant in England this fall.

Reproduced on the cover of a recent issue of *Iron Men of Hendy*, official organ of the Joshua Hendy Iron Works, was a pair of Hendy-designed land turbines—one a 2,000-kilowatt set, the second a 500-kilowatt—destined for an industrial area in Soviet Russia. Built in these two sizes, the turbo-generator sets are assembled at the plant and transported as units, complete with spare parts, to their installation points. Within 36 hours after their arrival they can be set up and put in operation.

W. O. Bates, Jr., vice-president of Caterpillar Tractor Company, Peoria, Illinois, has moved to San Leandro, California, to assume full-time administrative responsibilities as manager of the Caterpillar offices and plant there. Mr. Bates was appointed San Leandro manager early this year, but has divided the intervening time between the California plant and Caterpillar's subsidiary, Caterpillar Military Engine Company of Decatur, Illinois, where since November, 1942, he has served as a vice-president.

Frederic W. Thomas of the Worthington Pump & Machinery Corporation was elected a vice-president of the Purchasing Agents Association of New York at its recent annual meeting. Donald H. Lyons of the Johns-Manville Corporation was among those named to the association's executive committee.

Elliott S. Williams has been appointed the sales and service representative for the Hewitt Rubber Company of Pittsburgh, working in the Pittsburgh district. Mr. Williams formerly was associated with the Goodall Rubber Company.

Frank Klein, vice-president of Worthington Pump & Machinery Corporation, has been elected president of the National Association of Cost Accountants. For the past year he has served as vice-president of the association.

C. L. Burdick, assistant to the president of E. I. du Pont de Nemours & Company, has been named chairman of the board of Cia. Mexicana de Explosivos, operators of a dynamite plant in Mexico. Dr. Burdick is also chairman of the board of du Pont's general sales organization in Mexico City.

E. L. Oliver

At the commencement exercises of the University of California Edwin Letts Oliver, president of Oliver United Filters, Inc., was awarded an honorary degree of Doctor of Laws. Mr. Oliver, a graduate of the university's college of mining, was honored as the inventor of the filter which bears his name, valued for its utility in metallurgy, chemistry and general industrial fields throughout the United States and also abroad.

The Hercules Powder Company, Explosives Department, has announced new appointments for W. C. Hunt and H. V. Chase. Mr. Hunt was named assistant general manager; and Mr. Chase was appointed his successor as director of operations. Mr. Hunt previously had directed the operations of six Hercules-staffed ordnance plants and supervised seven Hercules industrial explosives plants. Mr. Chase had been until his new appointment manager of the rocket powder plant at the Sunflower Ordnance Works, Lawrence, Kansas.

C. H. Hirst

Charles H. Hirst is the new supervisor of the reorganized mining - equipment sales department of the Joshua Hendy Iron Works, which is resuming full production of all standard lines with improved and modernized designs.

Before joining the Hendy staff in 1940, Mr. Hirst spent 14 years in the Philippine Islands, representing the Ingersoll-Rand company and the Marsman Trading Corporation. His most recent position at Hendy was that of manager of production control and stores in the ordnance division.

The National Truck Leasing System of Chicago outlines the advantages of truck leasing under these heads: saving of time for executives; knowledge of costs in advance; elimination of maintenance worries; release of capital invested in trucks; smart, well-maintained delivery equipment.

In developing a proposal for a truck-leasing contract, the system's truck transportation experts prepare a cost analysis, including an estimate of the number of trucks for regular operation, the number for peak periods, the size of trucks and body equipment required, weekly rental charge and mileage charge for the given locality and type of equipment. This proposal is then submitted as the basis for a contract.

Dr. C. M. A. Stine, formerly a member of the E. I. du Pont de Nemours & Company executive committee and adviser on research and development, has resigned from these positions because of ill health; but he will retain his office of vice-president and director. Roger Williams, assistant general manager of the explosives department, was named Dr. Stine's successor.

Bradley Dewey, president of the Dewey & Almy Chemical Company, Cambridge, Massachusetts, received the honorary degree of Doctor of Laws from President Conant at the 294th commencement of Harvard College, in recognition of his work in the wartime synthetic rubber industry.

H. H. Buchanan

Lima Locomotive Works, Inc., Shovel and Crane Division, Lima, Ohio, and the Michigan Power Shovel Company, Benton Harbor, Michigan, jointly announced the appointment of Hugh H. Buchanan as director of foreign operations for both concerns.

Until recently, Mr. Buchanan was vice-president and general sales manager of the LaPlante-Choate Manufacturing Company, Cedar Rapids, Iowa. He brings to his new position a competent understanding of foreign sales and development gained from years of intimate contacts with users, distributors and dealers over the world.

Plans to establish a branch factory in England, better to serve the equipment needs of earthmovers there and on the European continent, have been announced by R. G. LeTourneau, Inc., at Peoria, Illinois.

Brig. W. E. R. Blood, in charge of the British Army Engineers' headquarters at

Brigadier Blood and Maurice Foote

Washington, D. C., is managing director designate of the new branch. The plant manager of the British factory will be Maurice Foote, formerly superintendent of LeTourneau plant No. 1 at Peoria. Denn M. Burgess, executive vice-president of the LeTourneau company, is now in England to select the necessary plant properties.

The United States Steel Corporation of Delaware has announced the resignation of Avery C. Adams as vice-president of sales. David F. Austin, vice-president in charge of sales of the Carnegie-Illinois Steel Corporation, has been named acting vice-president of sales by U. S. Steel.

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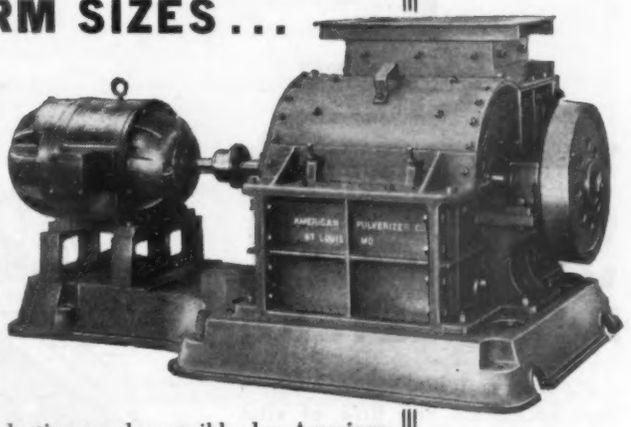
Hammer Mill
CRUSHERS



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A wide range of reduction made possible by American controlled action and adjustable breaker plates.

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The appointment of Colonel G. de Freest Larner as assistant to President T. M. Evans has been made by the H. K. Porter Company, Inc. Colonel Larner will have charge of termination of war contracts, renegotiations and special tax problems.

H. A. Feldbush

Harry A. Feldbush, formerly works manager of the Holyoke, Massachusetts, plant of Worthington Pump and Machinery Corporation, has been named vice-president in charge of engineering for the entire corporation. His headquarters will be at the general offices in Harrison, New Jersey.

Ralph M. Watson, formerly chief engineer of the Centrifugal Engineering Division, has been appointed assistant to Mr. Feldbush.

The sheet metal sales and manufacturing departments of the Aurora Equipment Company, Aurora, Illinois, have announced that after August 1 they will constitute a separate division known as Equipto.

Paul W. Litchfield, board chairman of the Goodyear Tire & Rubber Company, has recently completed 45 years of service with that organization. Mr. Litchfield started at Goodyear as superintendent in 1900. Outstanding among his many contributions to the rubber industry are his development of the straight side tire, the cord tire, the first pneumatic tires adaptable to motor trucks and buses and the Diamond Tread.

Colonel Joseph P. Woodlock has been elected executive vice-president of Rochester Ropes, Inc., according to a statement by W. L. Rochester, president. Colonel Woodlock comes to Rochester Ropes, Inc., from the Reconstruction Finance Corporation, where he has been associate director of the Office of Surplus Property.

A. G. Fellinger and H. F. R. Weber of the Link-Belt Company, have been promoted to new positions. Mr. Fellinger has become sales manager of power transmission machinery, with headquarters at the Ewart plant in Indianapolis. He was named to succeed C. W. Spalding, who died recently. Mr. Weber was appointed divisional sales manager of silent chain drives.

A. C. Fellinger

H. F. R. Weber

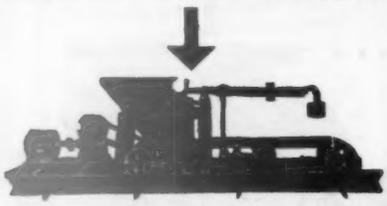
An announcement from the Euclid Road Machinery Company states that W. W. Paape has been appointed Euclid sales representative for Ohio and adjacent states, with headquarters in Cleveland.

The Hyster Company has appointed James A. Roach its factory representative for the Atlantic seaboard states, with offices in New York.

The Worthington Pump and Machinery Corporation has announced the following appointments of distributors for its construction equipment: the Clark-Wilcox Company, Boston; the Maine Truck Tractor Company, Portland, Maine; the Howard Corporation, Clayton, Missouri; A. M. Flanders, Inc., Barre, Vermont; the Milton-Hale Machinery Company, Albany, New York; the Landes Engineering Company, Salt Lake City; the Coast Equipment Company, San Francisco; the Atlas Equipment Company, Pittsburgh; the Carolina Tractor & Equipment Company, Raleigh, North Carolina; the Chicago Construction Equipment Company; the Lakesboro Machinery & Supply Company, Muskegon, Michigan; the Phillippi-Murphy Equipment Company, Minneapolis, Minnesota; the Olson Manufacturing Company, Boise, Idaho.

The George Haiss Manufacturing Company, Inc., has appointed the following new distributors for Haiss equipment: The Coast Equipment Company,

FAST PRODUCTION helps 'em sail OFTENER



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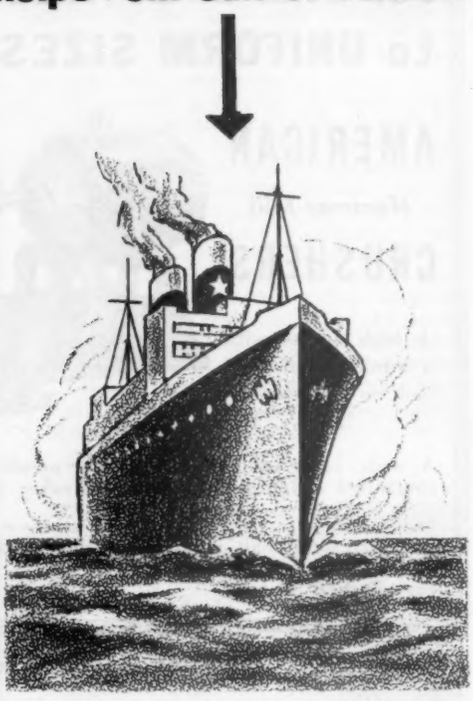

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SCHAFFER POIDOMETER CO., 2828 Smallman St., Pittsburgh 22, Pa.

San Francisco; the Union Tractor & Harvester Company, Ltd., Calgary, Alberta; the Plains Machinery Company, Birmingham, Alabama; the Harrod Equipment Company, Syracuse, New York; the Herman M. Brown Company, Des Moines, Iowa; A. M. Flanders, Inc., Barre, Vermont.

Gar Wood Industries, Inc., announces two new distributors for its hoist-and-body and tank divisions: the General Machinery Company, Spokane; and Equipos Hobbs S. A., Mexico City.

Lieutenant Colonel Myles (Ken) Stolz, formerly advertising and sales promotion manager for the Osgood Company and the General Excavator Company, Marion, Ohio, is here shown being con-

Maj. Gen. Twining and Lt. Col. Stolz

gratulated by Major General Nathan F. Twining, commanding general of the 15th Air Force in Italy, after having received the Bronze Star Medal. Colonel Stolz received the medal at the 15th A.A.F. Headquarters, where he is executive staff officer in operations, for "meritorious service in connection with operations against the enemy."

Appointment of Elliott G. Ewell as vice-president and manager of Mack's Southern Division has been announced by A. C. Fetzer, vice-president of Mack-International Motor Truck Corp. Mr. Ewell, who has been with the firm since 1924, will make his headquarters in Atlanta, Georgia. In 1939 he was named manager in Charlotte, North Carolina, a post which he retained until his present appointment. His place in Charlotte will be taken by L. D. Marshburn.

G. S. Crane

At the annual meeting of the board of directors of Cutler-Hammer, Inc., on June 15, the following officers were elected: G. S. Crane, president; F. R. Bacon, chairman of the board; H. F. Vogt, executive committee chairman vice-president and treasurer; J. C. Wilson, secretary and vice-president; P. B. Harwood, vice-president in charge of engineering; P. S. Jones, vice-president in charge of sales; Philip Ryan, vice-president in charge of manufacturing; E. W. Seeger, vice-president in charge of development; M. R. Fenno, assistant treasurer; J. C. Springer, assistant secretary.

The workers of Clark Tructractor at Battle Creek, Michigan, received another commendation for a job well done, by the addition of the fifth star to their Army-Navy "E" flag. Faster handling of food, supplies, ammunition and evacuation of American wounded from all theatres of operations have kept the production of all types of Clark fork trucks and industrial tractors at top speed.

Ernest C. Low, general manager of sales of John A. Roebling's Sons Company, Trenton, New Jersey, who has

E. C. Low

C. M. Jones

been associated with the company since 1910, has been named vice-president in charge of sales; John D. Thompson, works manager, who has been with Roebling's since 1940, becomes vice-president in charge of production; and Charles M. Jones, manager of engineering and connected with the Roebling organization since 1926, is now vice-president in charge of engineering. Archibald W. Brown, treasurer of Roebling's and with the company since 1902, has been elected a member of the board of directors.

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Shovel Dippers
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BUILDINGS OF ALL TYPES—
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YOU CAN PROFIT BY OUR TWENTY-FIVE YEARS EXPERIENCE
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FOR SAND, GRAVEL STONE, ETC.
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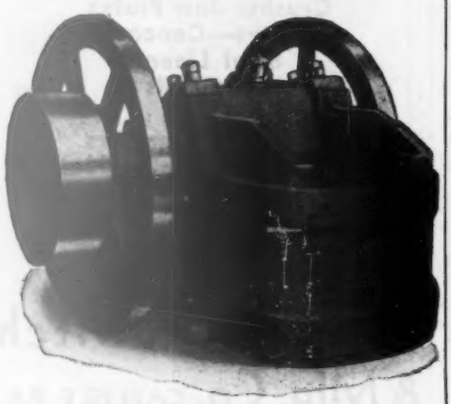

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Frank E. Milewski

Frank E. Milewski has announced that he and an associate have purchased a controlling interest in the Lith-I-Bar Company of Holland, Michigan. Mr. Milewski was formerly advertising manager for the W. E. Dunn Manufacturing Company of Holland, which until recently has operated the Lith-I-Bar Company. With the proposed addition of new equipment and installations during the coming year, Lith-I-Bar expects to modernize and improve its plant and enlarge its production considerably.

In preparation for more intensive sales activity, Robins Conveyors Inc., Passaic, New Jersey, manufacturers of materials handling machinery, has reorganized its sales department, which continues under the direction of Harold Von Thaden, first vice-president.

Under the new plan, E. C. Salzman, vice-president, formerly in charge of sales, assumes responsibility for all export operations, including dealings with foreign affiliates and agents.

Moving to Passaic from the Chicago office, which was under his charge, J. F. Meissner, vice-president, takes over control of all engineering sales and of the field engineers who devote their time and attention solely to matters involving the functions of designing and engineering materials handling projects and plants.

The equipment sales section is now under A. E. Conover, formerly manager of the Vibrating Machinery Division. His responsibilities include the direction of that portion of the field engineering staff who concern themselves with the sale of equipment, where little or no engineering is involved. Sales research and training has been put under T. W. Matchett, secretary of Robins Conveyors, Inc.

R. H. DeMott

Richard H. DeMott, vice-president in charge of sales for S.K.F. Industries, Inc., recently entered his thirtieth year of service with the Philadelphia firm. Prior to his association with S.K.F. Mr. DeMott had been employed by the Worthington Pump Company, the Westinghouse Lamp Company and other manufacturing firms.

J. L. Hyland, manager of the Cleveland district of the Republic Steel Corporation, has been granted a leave of absence while he serves as deputy chief of the metallurgical branch of the United States Control Council in Germany.

Recording Mill Feed of Aluminum Ore

One of the Merrick Weightometers installed in the conveyor line of the Rosiclare, Illinois, plant of the Aluminum Ore Company.

with MERRICK WEIGHTOMETERS

"They keep production moving like clockwork" . . . that is what the operators agree on down at the Rosiclare plant of the Aluminum Ore Company.

There, a Merrick Weightometer is recording the weight of the raw material being fed to the mill by an inclined belt conveyor. Another Weightometer records the feed just ahead of the raw grinding and classifying circuit.

MERRICK WEIGHTOMETER

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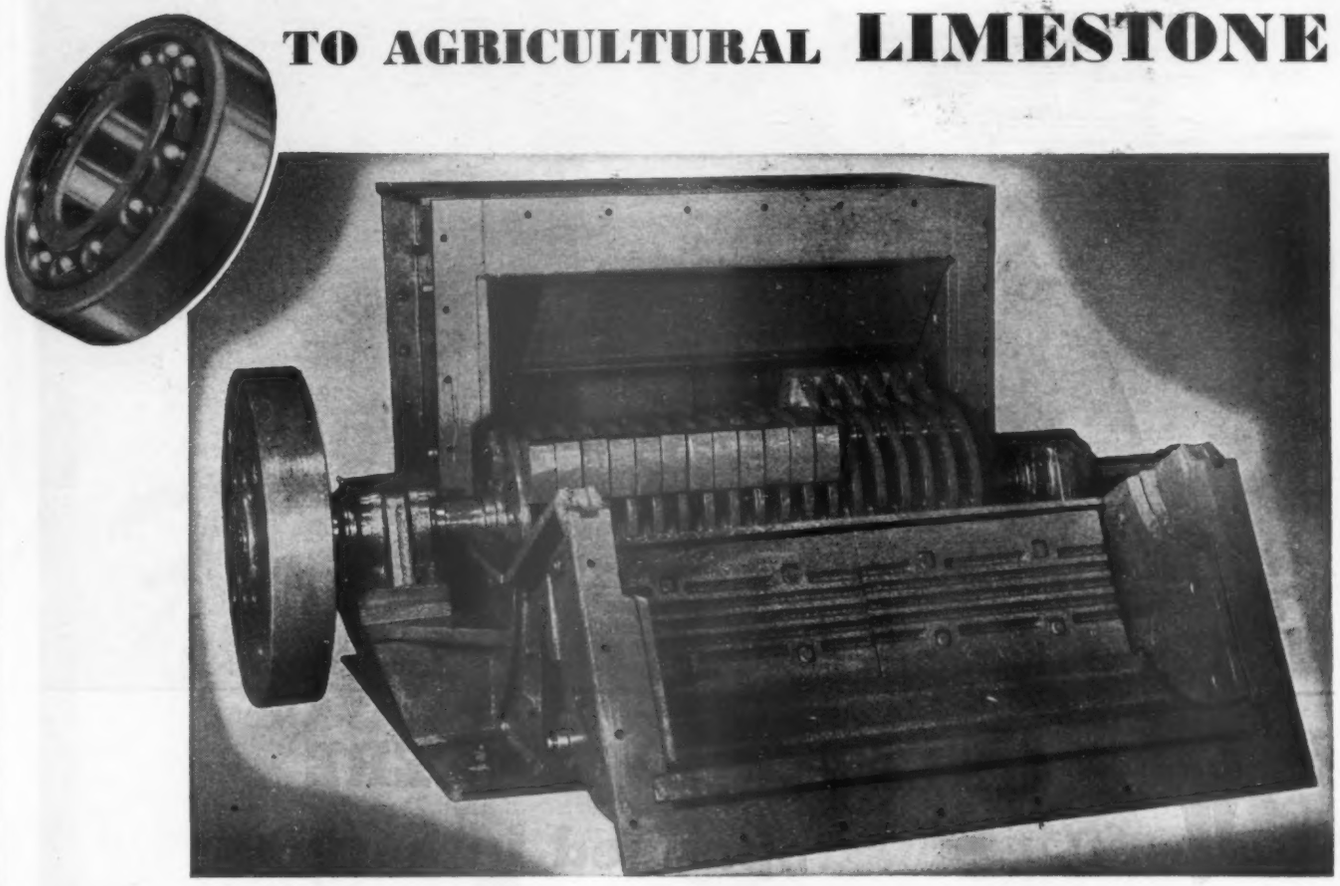

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This extensive service is the direct result of a fundamental sales policy of The Dorr Company—Dorr takes the view that it sells not merely equipment but *the solution to the problem for which the equipment is intended.* Therefore, Dorr's interest in the purchaser does not end at the time of installation but continues far beyond. Dorr equipment provides an efficient, economical solution of the client's problem.

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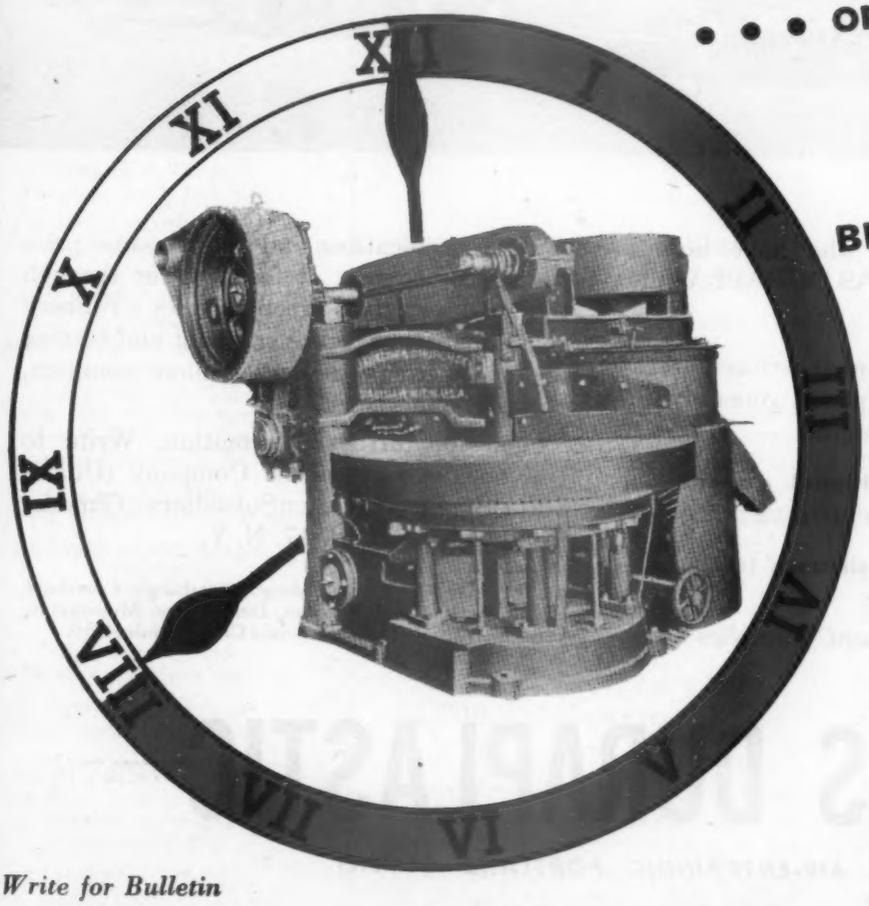

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SEPTEMBER, 1945

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J. A. CONVERSE

Louis Brookman, Jr., "Concrete" Publisher, Dies in Chicago

Louis Brookman, Jr., for many years publisher of *Concrete*, a trade paper serving the concrete field, died in Chicago, August 11, at the age of 53 years. Prior to taking over the publication of this magazine he had been in the advertising agency business and in the advertising department of the *Chicago Tribune*.

New Federal Committee To Issue Specifications

Unified federal specifications for precast lightweight reinforced concrete roof slabs are expected to be the first output of a new federal committee known as the Technical Committee on Precast Reinforced Concrete Products. This group, under the chairmanship of D. E. Parsons, chief of the masonry construction section of the National Bureau of Standards, and president of the American Concrete Institute, held its organization meeting in Washington, D. C., on August 2.

Use of Cinders Studied In Cooperative Project

A cooperative project undertaken by the cinder aggregate division of the National Concrete Masonry Association and the development department of the Portland Cement Association is the investigation and improvement of cinders as an aggregate for use in concrete masonry units. Important facts established in laboratory tests now are being tied into actual plant practice.

Pipe Manufacturers Win $2,700,000 Contract

A $2,700,000 contract was awarded on July 26 by the Eleventh Naval District, San Diego, to Concrete Pipe Constructors of Los Angeles for the fabrication and laying of 19 miles of concrete pipe line.

The 19-mile stretch is part of a 70-mile federally-financed aqueduct which will carry Colorado River water to the Navy at San Diego from the facilities of the Los Angeles Metropolitan Water District.

The entire project will cost an estimated $17,500,000. Recently an $800,000 contract was awarded to W. E. Callahan Co. and Shirley & Gunther, southern California builders, for three concrete tunnels along the aqueduct route. Bids on other contracts will be awarded soon.

Eadie Concrete Plant To Open This Month

Robert B. Eadie and Walter J. Eadie, of the Carmi Concrete Products Company, have announced that they have begun construction on their new plant at Carmi, Illinois. Machinery has been ordered, and production of blocks, bricks, roofing shingles, burial vaults and other concrete products will begin in September. Walter Eadie is a World War II veteran who won seven battle stars in major engagements in the Pacific theater.

Death Takes Pioneer Canadian Manufacturer

Bertrand Blair, founder and operator of the first cement-tile industry in Ontario, Canada, and a past president of the American Cement Pipe Manufacturers' Association, died recently in Woodstock, Ontario. In 1933 Mr. Blair became president and manager of the reorganized Woodstock Machinery Company, makers of gravel-crushing-and-screening machinery.

Tennessee Firm Plans New Cinder Block Plant

The General Shale Products Corporation, Johnson City, Tennessee, announces the early erection of a cinder block plant at Kingsport, Tennessee. When completed, production will equal the present output of their Kingsport brick plant in wall displacement, or the equivalent of 150,000 brick per day. The equipment will consist of the latest mechanical handling devices, and the product will be cured in steam drying rooms.

KAISER REPLACES TWO SEATTLE BATCHING PLANTS WITH NEW CENTRAL-MIXING PLANT

View of tripper and unloading conveyor at the Glacier Sand & Gravel Company's ready-mixed-concrete plant in Seattle.

another ON THE SPOT report

THE Henry J. Kaiser Company, which recently took over the Glacier Sand & Gravel Co. but has retained the firm name, has taken the first steps to reorganize the ready-mixed concrete operations in Seattle. The Hudson Street and Fairview Avenue batching plants which were described in the August, 1943, issue of PIT AND QUARRY, have been replaced by the Duwamish plant, which is located in the southern end of Seattle on Slip No. 2 of the Duwamish Waterway. This waterway is under control of the U. S. Army Engineers and is kept dredged, to accommodate large ocean-going vessels, to approximately 30 feet below mean low water.

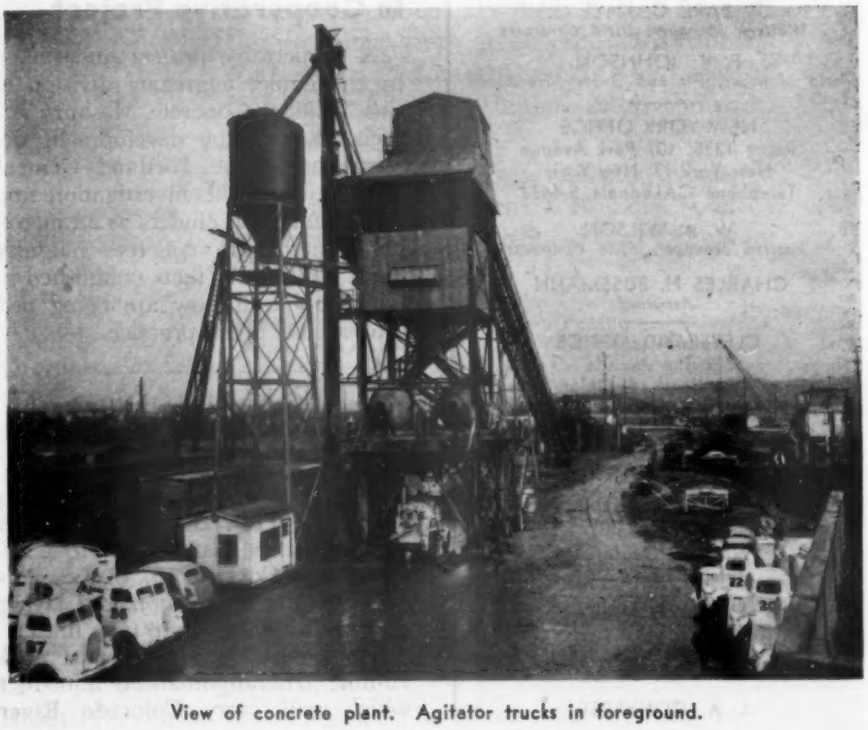
The sand and gravel for use at the plant is shipped in from the Glacier Sand & Gravel Co. pit at Steilacoom, Washington, on scows of approximately 600 ton capacity and placed at the unloading dock in Slip No. 2 for handling. This slip, adjacent to the property, has been dredged to accommodate gravel scows of ordinary draught, and a dolphin line has been established at the face of the dock to accommodate four loaded and three empty scows.

The unloading dock is built out approximately 60 feet from land and consists of two runways tied together for stiffening. One runway was designed to carry a batching bunker for direct unloading of material, and for truck access to the bunker. The other was designed to carry a crawler crane for means of unloading the scows.

The unloading crane is a Link Belt Model K38 with a 60-foot boom and a 1-cu. yd. clamshell material-handling bucket. The crane discharges into a 12- by 12-foot steel hopper which feeds onto a 30-inch, 125-foot conveyor belt driven by a 20-hp. electric motor. This belt discharges at a transfer tower onto a 30-inch by 160-foot conveyor, driven by a 30-hp. electric motor, which runs over the storage area and discharges the material into the six storage bins by means of a manually-operated traveling tripper. The tripper is so constructed that by means of a flop gate the material can pass through the tripper and be discharged back onto the belt for discharging off the head end of the conveyor and into ground storage beyond the regular storage area. By this means, waste material and the cleanup of scows can be stored and recovered by crane for use as fill or other purposes for which it may be suited.

All conveyor supports, structures, and hand rails are built of steel. All decks and walkways are constructed of 2-inch plank.

Under the storage area is a concrete reclaiming tunnel approximately 6 feet wide, 7 feet high and 140 feet in length with an escape tunnel at one end. The steel supports for the storage conveyor and tripper rest upon independent concrete footings on a pile foundation. These conveyor supports are faced on both sides with 4-inch plank to form the partitions for the various storage compartments. Surrounding the entire storage area is a dirt berm to act solely



View of concrete plant. Agitator trucks in foreground.

as a retaining wall to keep the stored aggregates in bounds. Each of the six storage compartments has a reclaimable storage of approximately 300 tons through two bin gates in each bin into the concrete reclaiming tunnel.

Each of the bin gates can discharge its material into a single traveling hopper, that is built onto the reclaiming tunnel conveyor, to be transported to the mixing plant. The 24-inch by 38-foot tunnel conveyor is driven by a 40-hp. electric motor.

The mixing plant is a 6-compartment, all-steel plant. Five compartments of approximately 50 cu. yd. capacity each are used for aggregates and one cement compartment of approximately 250-barrel capacity is used for high-early-strength cement. An independent cement silo on steel supports and having a capacity of 400 barrels of cement is adjacent to the plant and is used for storage of standard Portland cement.

The cement is brought into the property in bulk by means of railroad cars on a spur adjacent to the plant. This cement is unloaded by means of an electric-powered Butler "Cement Hog" and dumped into a car hopper from which it is fed to the elevator boot by means of a screw.

A vertical bucket elevator raises

Main conveyor from the reclaiming tunnel to the main plant.

the cement from the elevator boot to either of the two cement silos. The cement is transferred as needed to a single cement batcher on the batching floor of the mixing plant by means of a screw conveyor.

All batching is done on a 5-beam aggregate scale and single-beam cement scale. All bin gates are opened by means of air rams and are automatically controlled for opening and closing by means of mercoid switches. The aggregate-weighing batcher has a capacity of 2½ cu. yd. and the cement weighing batcher a capacity of 4 barrels. Water is controlled by either a calibrated tank or an automatic meter at the option of the operator.

View of storage area showing stockpiling conveyor and tripper.

The batched load is discharged by means of an air-ram-operated gate into a pant-leg chute which reaches two 2-cu. yd. Smith 56S tilting drum mixers. Selection of the mixer is made by the operator by means of a flop gate.

Both mixers then discharge into a single 4-cu. yd.-capacity hopper for discharging into mixer trucks. The discharge gate of the hopper is air-ram operated and can be controlled by either the operator on the batch floor or by the truck driver at the ground level.

Air is furnished the plant from a 277-cu. ft. Chicago Pneumatic compressor and a 36-inch by 8-foot air receiver. Approximately 80 pounds pressure is maintained on the batching floor for proper operation of the gates.

All bins in the mixing plant have bin indicators which flash a light on when full at the entrance to the reclaiming tunnel. Bin selection is made at the mouth of the tunnel by means of a cable-operated swinging spout. Contacts on the swinging spout light an indicator, also at the tunnel mouth, to indicate to the tunnel man into which bin the spout will discharge.

Also located on the same property is a small repair shop, a grease rack and wash rack for the maintenance of the fleet of 35 Jaeger agitator trucks.

The program calls for the construction of another batching plant on property owned by the company on the north side of Lake Union but no date has yet been set for this. This north-side location would give the company short-haul coverage of the Seattle area from plants located on opposite sides of the business district.

The earlier article mentioned above told how the Glacier Sand & Gravel Company, after seventeen years of sand-and-gravel production for wholesale sale only, entered the ready-mixed-concrete business in 1940, when it took over the Crosby Lighterage Company. The Glacier company was later taken over by the Klinker Sand & Gravel Company, also gravel and concrete producers, and then by the Henry J. Kaiser Company.

Kinney Plant Leased To Eberhart & Chapple

A foundry building in Pendleton, Indiana, has been leased by H. M. Eberhart and C. M. Chapple, who will operate a plant for the manufacture of concrete blocks and other products.

Evans Concrete Business Sold to Devening

J. Edward Evans, of Shelbyville, Indiana, proprietor of a concrete products business at Garden City, recently sold his holdings to Norman C. Devening.

DETAILED COST FIGURES, WAGE RATES, PRICES DISCLOSED BY READY-MIX FIRM

another P and Q exclusive

WHILE much information has been published on the design and operation of ready-mixed-concrete plants, little has been said about the operating costs and the prices obtained. This has been due partly to the fact that comparatively few producers keep detailed cost figures and also because those who do keep such figures are not willing to divulge them to competitors. In this article, we believe for the first time, are given the detailed cost figures of a company which has been regarded as one of the leaders in its field since it began operations more than fifteen years ago. Its one plant is located in the metropolitan area of a large city, and its problems are more or less typical of those of producers located in large cities.

This company early in its existence employed a leading accounting firm to devise for it a complete cost-accounting system which, once started, is comparatively simple to keep up. With this system, every item of income and expense is recorded and the books are balanced monthly on sheets such as those illustrated. Company officials believe that it is necessary, even in a comparatively simple business such as this, for an operator to know his itemized costs in each department, so that intelligent steps can be taken to lower them. Any one of several items can wreck a company financially, if not checked in time.

A brief history of this company and its plants should be of interest to the reader so that he can compare his own figures with those presented. The original plant, built late in 1929, was a central-mixing operation. The use of bulk cement was adopted in 1930 and this is believed to be the first such operation in this area. In 1935 the plant mixers were removed and since then only transit-mixed concrete has been produced. In 1936 a second plant was built and a fleet of 26 truck-mixers was operated. Later the operations were centralized at one plant and this had a fleet of 15 mixers in 1944 of which only 6 were kept busy because of the low volume of construction. This plant can keep a fleet of 18 mixers busy in normal times.

This company was also among the first to try other new mechanical developments and methods in its effort to operate as efficiently and economically as possible under the conditions existing in this area. Every item and operation now in use is the result of time studies of equipment and employees. Cement, for example, was received successively in sacks, in bulk in box cars, and in bulk in special cars. It was handled successively by screw-conveyors and bucket elevators and the portable and stationary bulk-cement-pumping systems. The present system of l.c.l. bulk containers, now in common use in this area, has been found to be the most economical.

Several aggregate-handling methods were also tried. Now both fine and coarse aggregates are received

PLANT COST ANALYSIS

	Plant	Derrick	Cement Handling
Depreciation	$ .065	$ .030	$ .005
Insurance	.007	.007	
Real Estate and Taxes	.013	.013	
Wages	.139	.075	.005
Electric Power and Light	.013	.020	.006
Maintenance	.040	.023	.005
Water	.015		
Demurrage Credits		.024	
Total	$ .292	$ .144	$ .021
$ .457 per cubic yard			

*Debit.

Derrick handling costs $.11½ per cubic yard of raw material used in production.

Cement handling costs $.017 per barrel of cement used in production.

Derrick rope costs $.01 per cubic yard—concrete.

TRUCKING COST ANALYSIS

		Pct.
*Average Operating Cost per Truck per Day	$33.70*	
Drivers' Wages	$11.22	33
Maintenance and Miscellaneous	9.30	28
Depreciation (5 Years)	6.50	19
Fuel and Oils	2.90	9
Insurance	2.15	6
License	.89	3
Storage	.74	2
Total	$33.70	100

*Average operating cost per truck determined by dividing total trucking expense for the year, using 5½-day week for 52 weeks times the number of trucks in the fleet, as divisor.

TRUCKING COST ANALYSIS

(Cents per cubic yard.)

	Passenger Cars	Trucks		Shop	Total
		Body	Chassis		
Depreciation	$ .010	$ .055	$ .107	$ .003	$ .175
Insurance	.005	.045		.005	.055
License		.022			.022
Real Estate and Taxes		.011		.005	.016
Operating wages		.322			.322
Motor Fuel	.005	.028	.028		.061
Motor Oil and Grease		.005	.010		.015
MAINTENANCE (Outside labor and parts)	.005	.038	.100		.143
REPAIR SHOP					
Wages		.030	.040		.070
Maintenance and Tools		.005	.007		.012
Power and Light				.003	.003
Total	$0.025	$0.853		$0.016	$0.894

Tire costs and maintenance 40%—(4 cents per cubic yard) of chassis-maintenance costs.

COST ANALYSIS

	Total	Per Cent. of Total Income	Cost per Cubic Yard
Raw Material	$576,524	64.	3.64
Wages and Salaries	118,033	13.	.74
Maintenance and Expenses	63,252	7.	.40
*Depreciation:			
Trucks 5 years	27,302	4.7	.27
Plant and Property 8 years	15,850		
Oil, Gas and Fuel Oil	12,314	1.3	.08
Insurance (all classes)	9,042	1.	.06
Rent and Real Estate Taxes	6,721	0.7	.04
Power and Light	5,774	0.7	.035
Truck License	3,635	0.4	.02
Telephone and Telegraph	1,954	0.2	.01
Total Expense	$840,401	93.—	5.295
Total Income	904,896	100.	5.70
Net Income (before taxes)	64,495	7.+	.405

*Truck depreciation includes Shop Building and Equipment plus Body and Chassis Depreciation. Plant depreciation includes Office Building and Equipment plus Plant Depreciation.

BLANK CONCRETE, INC.

MONTHLY COSTS AND SALES

PLANT _____ 194__

	CURRENT MONTH		Cost	YEAR TO DATE		Cost
	Quantity	Amount	Per Cu. Yd.	Quantity	Amount	Per Cu. Yd.
Raw Material—						
Cement						
Sand						
Stone						
Gravel						
Grits						
Miscellaneous						
Concrete—						
Total						
Plant Expense:—						
Insurance						
Rent & R. E. Taxes						
Wages and Salaries						
Light and Power						
Maintenance and Repairs						
Water						
Demurrage						
Handling Charges						
Derrick—Wages						
Derrick—Insurance						
Derrick—Electric						
Derrick—Maintenance						
Total Plant Expense						
Cartage Expense:—						
Insurance						
Truck Licenses						
Storage						
Truck Drivers' Wages						
Gasoline						
Diesel Fuel Oil						
Oil and Grease						
Maintenance and Repairs–B						
Maintenance and Repairs–C						
Outside Cartage						
Repair Shop Wages						
Repair Shop Maintenance						
Repair Shop Electric						
Truck Hire Income						
Total Cartage Expense						
Selling and Administrative Expense:—						
Office Salaries						
Commissions						
Advertising						
Selling Expense						
Interest Expense						
Certification						
Insurance						
Telephone and Telegraph						
Postage						
Stationery and Supplies						
Dues and Subscriptions						
Legal and Professional						
Taxes–Fed., State, City						
Officers' Salaries						
Miscel. Admin. Expense						
Office Heat						
Office Maintenance						
Depreciation—Plant						
Depreciation—Trucks						
Depreciation—Pass. Cars						
Depreciation—Office-Shop						
Total Selling and Admin. Exp.						
GRAND TOTAL EXPENSE						
SALES CONCRETE						
SALES DISCOUNTS						
MISCELLANEOUS INCOME						
TOTAL INCOME						
NET INCOME						

in barges and are rehandled to a hopper by a clamshell derrick. A belt-conveyor feeds from the hopper to the plant bins. Sand, gravel and crushed stone aggregates are used with no admixtures.

COST ANALYSIS

	Cost per Cubic Yard	Pct.
Material: Cement	$2.16	38.
Fine and Coarse Aggregate	1.48	26.
Plant: (including depreciation)	.455	8.
Truck: (including depreciation)	.89	15.5
Selling and Administration	.31	5.5
Total Expense	5.295	93.—
Total Income	5.70	100.
Net (before taxes)	.405	7.+

Ordinary manually-controlled cement and aggregate-weighing batchers are now used in the plant. Mixing water from city mains comes through a 4-inch line.

The types of delivery equipment used have also kept pace with the changes in the industry in general. In that order of progress they included bath-tub bodies, all types of agitators and now all types of transit mixers. Gasoline trucks were first used, but when suitable Diesel engines became available, these were tried with the result that the company's entire fleet is now Diesel-powered, using split-shaft power take-offs to operate the concrete-mixer bodies.

BLANK CONCRETE, INC.

COMPARATIVE BALANCE SHEET

ASSETS	Current Month	Previous Month	
Current Assets			
Cash in Bank			
" Imprest			
Accounts Receivable			
Notes Receivable			
Inventories—Materials			
TOTAL CURRENT ASSETS			
Fixed Assets			
Plant and Equipment			
Less Depreciation			
Trucks			
Less Depreciation			
Passenger Cars			
Less Depreciation			
Shop Equipment			
Less Depreciation			
Office Building and Equipment			
Less Depreciation			
TOTAL FIXED ASSETS			
Deferred Assets			
Prepaid Insurance			
" Truck License			
" Taxes (Federal, State & City)			
" Plant Expense			
" Delivery Expense			
Accruals			
TOTAL DEFERRED ASSETS			
TOTAL ASSETS			
LIABILITIES AND CAPITAL			
Liabilities			
Accounts Payable			
Notes Payable			
Mortgages Payable			
Accrued Payroll			
Accrued Taxes (Federal, State & City)			
Other Accruals			
TOTAL LIABILITIES			
Capital, Reserves, and Surplus			
Common Stock			
Reserve for Doubtful Accounts			
Surplus			
Surplus Adjustments			
Net Operating Profit (Cost and Sales)			
TOTAL CAPITAL, RESERVES AND SURPLUS			
TOTAL LIABILITIES AND CAPITAL			

The company maintains close control over the concrete until it is delivered to the forms. As most of the output goes to various city departments, port, harbor, bridge and other authorities, etc., their rigid specifications must be met. As many as six of their inspectors have been located at the plant at one time.

There are now seven commercial concrete-producing companies in the metopolitan area of this city. These operate a total of 15 plants and have fleets of from 15 to 80 mixers or agitator trucks each. The total number of trucks owned by these companies is only about 60 per cent. of the number they owned in 1941, as most of them have junked obsolete units and have sold others to producers in areas not adversely affected by the low volume of private construction. In addition, there are said to be a few contractors in the area operating fleets of 6 or fewer trucks.

Because of the distribution of plants throughout the metropolitan area and the heavy traffic conditions, producers do not use the zone price system which those in other areas have generally adopted. Instead, they all use a plant price with no additional mileage charges. Most plants can deliver economically within only a 5- to 6-mile radius because of the heavy traffic, short blocks, many traffic lights, narrow streets, etc. which hold the average round-trip speed down to about 8

(*Continued on page* 140)

Terrazzo Firm Makes Wartime Shift To Concrete Practice Bombs for Army

The Grassi-American Terrazzo plant in San Francisco makes concrete bombs from concrete molds.

The processing department, where the bombs are smoothed, checked and stenciled.

another ON THE SPOT report

CONCRETE has played an important role in this war by conserving critical metals for more essential uses. Much has been published regarding the substitution of concrete for iron or steel in the making of man-hole covers, fuel-storage tanks, bathtubs, and barges. There is another adaptation of this versatile material, however, which has been little publicized but which has played a direct part in helping to blast the enemy from the face of the earth — the manufacture of concrete practice bombs. Several million dollars' worth of these precision-made units have been turned out by various plants in the United States to enable Uncle Sam's flyers to gain skill in pin-point bombing, to make reasonably sure that when the time comes to drop fully-loaded charges on enemy targets the bombings will be completely effective.

In the early months of the war practice bombs were being made of thin sheet iron and were given weight by a filling of sand. These proved unsatisfactory for several reasons; it was difficult to keep the center of gravity uniform, thus spoiling the aim of the bombardier as the missile sped earthward; the sheet iron rusted and the bombs refused to slide from the bays promptly; the sand-filled "tin cans" dented too easily. It was in the development of the technique of "skip" bombing, whereby the bomb is released in such a manner from a war plane that it strikes the water and skips horizontally to blast an enemy ship in its vulnerable sides, that the War Department conceived the concrete practice bomb, drew plans for its manufacture and got it into production.

The concrete bomb has overcome

By HARRY F. UTLEY

all the faults of the old sheet-iron bomb. It speeds to its target with the same accuracy as does a true bomb. It costs but a few dollars to manufacture and saves precious metal for more vital needs.

The Smaller War Plants Corporation in March, 1945, negotiated a prime contract, in accordance with the power conferred upon it by the Congress, for the manufacture of 975,000 M85 concrete practice bombs. The Smaller War Plants Corporation contract with the War Department called for the delivery of 75,000 M85 concrete practice bombs to be delivered each month thereafter. The Smaller War Plants Corporation took the prime contract to produce 975,000 M85 concrete practice bombs in order to distribute contracts to the greatest possible number of small plants.

Hoisting the batch box of aggregates to the mixer at the left.

Small plants formerly producing these M85 concrete practice bombs were selected for the production programs for the months of April, May, June, and July. Additional plants in the areas near the air fields were added for production in the months of August through January, 1946. The prices submitted by small plants throughout the country have been equal to or less than the prices submitted by large plants, and production by the small plants has been more than satisfactory.

The combined firms of P. Grassi & Company and the American Terrazzo Company of San Francisco have been awarded contracts for the production of M85 concrete practice bombs by the Smaller War Plants Corporation for the entire program, April through January, 1946. This company has contributed a great many successful mechanisms that

Pouring concrete through the funnel into the bomb nose aperture.

have benefited the concrete-bomb program, thereby aiding the war effort.

As the accompanying illustrations

Freshly made concrete bombs and unopened molds are seen alternately on the curing floor.

show, the bombs produced in the Grassi plant are cast in individual molds which are themselves made of concrete. A set of molds consists of two sides, a bottom piece, and one extra bottom piece. The side forms are removed after the concrete has taken its initial set and the fresh bomb remains on the bottom mold, the side molds and second bottom mold being assembled and oiled for re-casting. In this assembly two metal suspension lugs are snapped into position, four fin bolts are inserted and a reinforcing cage of expanded-metal lath is centered in the mold.

Aggregates, consisting of concrete sand, and crushed pea gravel passing ½-inch mesh and retained on ¼-inch, are trucked into the plant and batched by volume. Actually the proportions are 135 pounds of sand, 135 pounds of gravel to one sack of high-early-strength cement. Six gallons of mixing water, based on aggregates in the dry state, is used to a batch. Increased workability is gained through the use of Trip-L-Seal and Anti-Hydro admixtures, plus a small amount of calcium chloride. The admixtures are introduced with the mixing water and a jet of compressed air keeps the water in the storage drum constantly agitated to insure that the proportions remain uniform.

A 6-cubic-foot Jaeger mixer with a stationary drum and revolving paddles mixes the concrete, which is poured into the bomb mold through a small opening at the nose end with the aid of a funnel. A vibrator set in the floor assures thorough compaction and prevents voids. Filling a mold requires about 45 seconds and it is immediately trucked away to the curing floor and an empty mold is placed on the vibrator slab to repeat the process.

Production is maintained at the almost uniform rate of 500 bombs per 8-hour day. A day's production is allowed to cure overnight, the

Salvatore ("Ted") Grassi is checking the center of gravity of one of the bombs. The lever assembly for making the pull test on the supporting lugs is seen at the right.

Skid-load of bombs ready to be trucked to processing department. The four protruding bolts are used to fasten the fin to the tail; small cavity is for inserting explosive charge.

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bombs being arranged in rows 8 feet apart, 2 feet separating each pair of bombs. The mild, slightly damp atmosphere of San Francisco makes ideal curing possible and no heat or added moisture is ever required.

From the curing floor the bombs are laid, 22 to a skid, and rolled to the processing department by Barrett-Cravens lift-trucks. Here they are placed on long wooden benches where neat-cement grout, to which fine marble dust has been added, is rubbed over the bomb and wiped off with burlap. The missile is finally rubbed down with fine sandpaper until its surface is perfectly smooth. The bombs are then inspected visually for concentricity, are given a spanner test to check the spacing be-

One of the bombs after the side forms have been stripped from the mold.

tween the two U-shaped lugs (by which it is carried in a plane), the four fin bolts protruding from the tail are checked for depth, and the bomb is stenciled "Practice Bomb

Skid-load of 25 complete bombs ready for shipment, showing method of protecting the missiles from damage during transportation.

100 Lb. M85" together with code numbers indicating the source and date of manufacture, lot, etc. Inspection then continues, the bomb being weighed, a variation of 3 pounds plus or minus its specified weight of 95 pounds being allowed.

Its center of gravity is next checked with a tell-tale pointer balance; a pull test on the lugs, the initial pull being 500 pounds and the final 800 pounds, is accomplished in a special device consisting of an assembly of levers making it possible to utilize small, easily handled weights to carry out the test. The final inspection operation is a "tip test" whereby the bomb is tipped and allowed to fall on the concrete floor which it must undergo without suffering superficial damage such as chipping, spalling or cracking.

Truck being loaded with bombs on the ramp at the Grassi plant.

After the completion of the tests outlined by the company's own inspectors, with a rejection a rarity, the bombs are ready for random inspection by the Ordnance Department and are then prepared for shipment. A wooden base protector is fastened with nuts to the four fin bolts projecting from the base. (These bolts are used to fasten the fins to the tail of the bomb to guide it in its flight and are attached at the air field when the bombs are prepared for use; at that time a small explosive charge for marking purposes is also inserted in a cavity in the base of the bomb). A wooden strip which protects the supporting lugs is fastened in place with steel strapping and the finished bombs are snugly strapped, 25 to a load, on a wooden shipping skid. The loaded skids are trucked onto flat-bed motor trucks which transport them to box cars for shipment to various military air fields.

The Grassi-American plant employs about 45 workers, some of them women. Production is supervised by Salvatore "Ted" Grassi and his partner Elio Filippi who (as did their fathers before them) spent careers in the production of fine examples of cast concrete.

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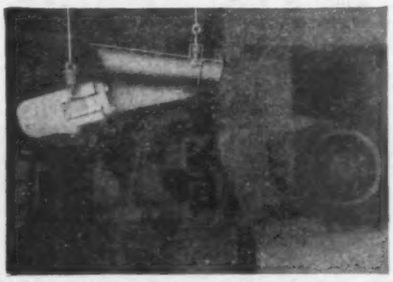

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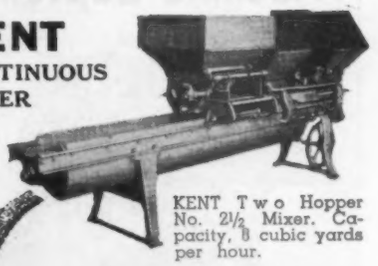
KENT CONTINUOUS MIXER



KENT Two Hopper No. 2½ Mixer. Capacity, 8 cubic yards per hour.

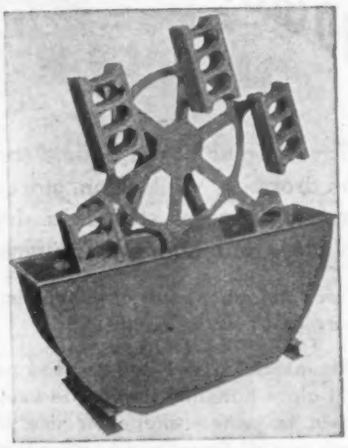
A STEADY STREAM OF PERFECTLY PROCESSED CONCRETE — insured by this KENT machine—is just what your block plant needs to establish output and profit records.

KENT accuracy in measuring cement and aggregates — KENT thoroughness of mixing — KENT simplicity and durability — KENT operating economy—enable concrete block producers everywhere to handle current orders and "get set" for bigger post-war business.

For Clean Pallets . . .

dip 'em in the

KENT DUNKER



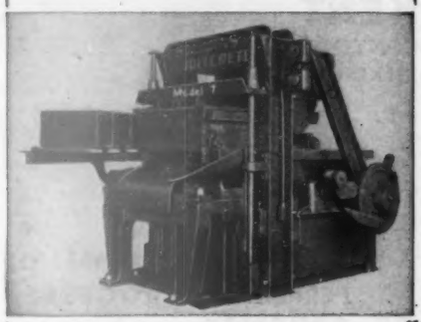
Your pallets will mold better blocks and give longer service if they are regularly cleaned and oiled in a KENT Dunker. Hang 'em on the pins—as you take them off, the rest are rotated through the tank. Truck crank case oil works perfectly.

Write for Bulletin

The KENT MACHINE CO.

Cuyahoga Falls, Ohio

The Vibration Machine Supreme



Vibration under pressure — 7,200 blows per minute—and ruggedly built to give long life, the Joltcrete machine is the choice of the wise concrete-products operator. Produces clean-cut, high strength units in any size, and gets the most out of a bag of cement. Built in three sizes with capacities of 7 to 9 standard units per minute.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers and Cast Iron and Press Steel pallets, Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager — Columbus, Ohio

"NO KID GLOVE HANDLING"

Commercial Cored Pallets can be dropped, walked on, stored in wet places, stored in dry places, and nothing happens.

Treat any other kinds of pallets that way and see the results.

Commercial Cored Pallets need no kid glove handling in order to keep them in perfect shape for use at any and all times, and besides that they fit the core box; no filing, no grinding, no planing or sawing. When they reach you from our Plant they are ready to go right into the machine.

Why waste time and money on other types?

Write for our little folder, "Here's the Dope"

THE COMMERCIAL SHEARING AND STAMPING CO.
YOUNGSTOWN, OHIO

Cost Figures *(from page 135)*

m.p.h. Beyond this range a neighboring competitor usually has a delivery advantage. In some outlying districts hauls can be made economically 8 miles or more from the plants.

The price situation in this area has been quite changeable due to price wars and other local conditions. The average price of $5.70 per cu. yd. received in 1942, the year for which these figures were computed, is considerably under the average in the last 10 years and was due to upset industry conditions. The following are the average prices received and the output of this company for the years 1935 to 1944 inclusive.

Year	Average price per cu. yd.	Production (cu. yd.)
1935	$6.47	$ 56,100
1936	6.88	72,400
1937	6.57	86,500
1938	5.90	74,600
1939	5.81	159,600
1940	5.81	147,500
1941	5.34	108,200
1942	5.70	154,900
1943	6.50	25,155
1944	7.00	16,200

Some operators in the area have tried truck-mixers as small as 2 cu. yd., but these proved to be impractical because of the fact that only 1 or 2 per cent. of the orders received are for less than 10 cu. yd. each, whereas in other cities small orders often predominate.

As a result, most producers in this area have standardized on 5¾-cubic yard truck-mixers—known locally as the "Metropolitan design." These are designed for us in cities where there are no load limits and are 2-axle, 6-tire machines using 11-inch front and 13-inch rear tires and having a gross weight of 45,000 pounds with a full load. This size of mixer is said to be the largest practical for this area where the machines are restricted to 35-foot height, 35-foot length for a single vehicle, and 65-foot length for a truck-trailer combination. The state weight restrictions, which are in effect, do not apply in any county wholly included in a city.

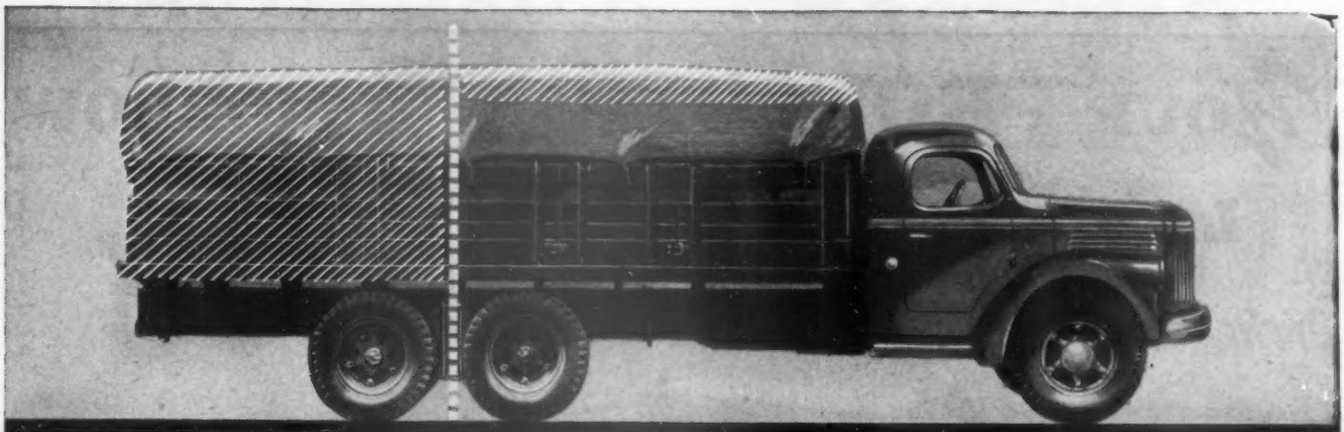
Other interesting local conditions include the fact that very few producers of aggregates in this area—and this includes some of the largest in existence—have any concrete producer or dealer setups. This makes a concrete producer virtually independent of any single source of supply. There is also much inter-company truck rental, even during busy periods, which makes it possible for a concrete producer to take contracts beyond his own plant or truck-mixer capacity.

SUMMARY OF WAGE AND HOUR CONDITIONS

A—International Hod Carriers, Building and Common Laborers Union of America.
Local 18A—Cement and Concrete Workers. Includes batchers, truck spotters, bulk or package cement handlers.
B—International Hod Carriers, Building and Common Laborers Union of America.
Local 1175—Sand, Gravel, Crushed Stone, Ashes and Material Yard Workers. Includes boat trimmers, dock men, general yard labor, watchmen if they do any yard cleaning labor.
C—International Teamsters, Chauffeurs, Warehousemen and Helpers of America.
Local 282—Building Material Chauffeurs.
D—International Hoisting Engineers and Firemen of America.
Local 25—Building Construction Workers.
E—International Association of Machinists.
District 15—Includes all plant and truck mechanics and mechanics' assistants.

	A[1]	B	C	D	E
HOURS					
Regular day	8 hrs.	8 hrs.	8 hrs.	8 hrs.	8 hrs.
Regular week	6 days (48 hrs.)	5½ days (44 hrs.)	6 days (48 hrs.)	5 days (40 hrs.)	6 days (48 hrs.)
Minimum for reporting when not employed	None	2 hrs.	None	.....	None
Minimum when employed	4 hrs.	4 hrs.	8 hrs.	40 hrs.	8 hrs.
Guarantee	None	None	None	40 hrs.	None
RATES/HOUR					
Regular Time	1.21-3/7	.84½	1.06¼	2.00	1.00 Min.
Overtime	1.82-1/7 (1½)	1.26¾ (1½)	1.59⅜ (1½)	4.00 (2)	1.50 (1½)
Sunday and holidays	2.42-6/7 (2)	1.69 (2)	2.12½ (2)	4.00 (2)	1.50 (1½) Sun. 2.00 (2) Hol.
Sunday and holidays after 8 hrs	2.42-6/7 (2)	1.69 (2)	3.18¾ (3)	4.00 (2)	2.00 (2)
No. of holidays with regular pay if not worked	11[2]	6[2]	11[2]	11	6
Vacation	None	None	See footnote[3]	None	None
Expiration	12/31/43	3/31/45	6/30/45	See footnote[4]	12/6/43

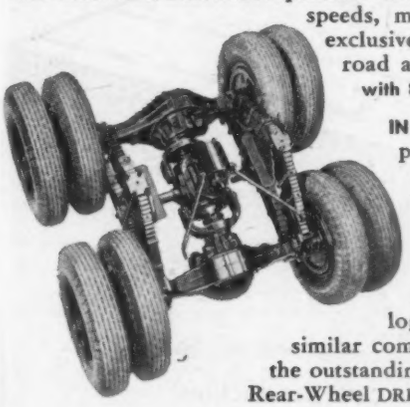
NOTE:
1. If 4 or more loads of concrete are produced at plant two workers minimum to be employed at that plant.
2. Workers working three (3) full days to be paid 8 hours for holidays occurring that calendar week.
3. One week's vacation with 48 hours pay, provided worker has worked 120 days in a calendar year. If the worker is paid for a holiday it shall be considered a working day.
4. There has been no written agreement with Hoisting Engineers Local for past seven or eight years.



HOW TO GET A BONUS OF 100% MORE PAYLOAD

A THORNTON Four-Rear-Wheel DRIVE installed on your new or used 1½-2 ton medium truck will double its payload capacity—give it the earning ability of two standard medium trucks, without the upkeep costs or extra driver's wages that two standard trucks require.

THIS RUGGED precision-built Thornton conversion wholly transforms your medium truck from the cab back . . . with new overlaying frame members engineered for 9 to 20 foot bodies; dual rear spring assemblies; two driving axles under the load—all providing the 100% bonus payload. In addition, the Thornton Drive incorporates a 2-speed gear case which doubles forward speeds, motor torque and rim-pull; gives you exclusive "walking beam" type springs that cut road and load shock in half; **comes complete with 8 brand new tires.**



IN TOTAL, a Thornton Drive gives you performance that no conventional truck can offer . . . ability to shoulder heavy loads through toughest off-the-highway areas . . . climb grades as steep as 50% . . . maneuver flexibly and speedily through traffic and on the highway. No matter what you haul—logs, lumber, coal, gravel, milk, or any similar commodity—it will pay you to investigate the outstanding advantages of the THORNTON Four-Rear-Wheel DRIVE. **Send the coupon for full details—today!**

PLUS

50% Gradability

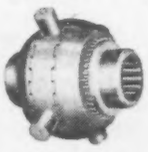
Thornton's 2-speed gear case doubles speed ranges, gives a 2.04-1 low ratio, permitting loads of 26,000 lbs. G. V. W. to be hauled up grades as steep as 50%.

PLUS

100% More Traction

Thornton's two driving axles and 2-speed gear case double a standard truck's normal tractive ability, motor torque and rim-pull.

The heart of the THORNTON DRIVE is the exclusive THORNTON Automatic Locking DIFFERENTIAL which gives both axles POSITIVE DRIVE and DIFFERENTIAL ACTION without "axle fight." Available as replacement in many standard trucks. Write for details.



The ODT, recognizing the importance of the THORNTON Four-Rear-Wheel DRIVE, allots 8 new tires, any size, with each Thornton unit. You get them for your truck when you have a THORNTON Four-Rear-Wheel DRIVE installed.

NO PRIORITY OR RATION RELEASE NECESSARY

EVERY

THORNTON 4-Rear-Wheel DRIVE

INCORPORATES A

THORNTON Locking DIFFERENTIAL

ALSO AVAILABLE FOR TRUCK AXLES

Thornton Tandem Co.

8701 Grinnell Avenue, Dept. 55, Detroit 13, Michigan, U. S. A.

Please send me catalog of facts on changing my 1½-2 ton truck into a heavy duty truck.

Name _____

Address _____

City _____ **State** _____

Make of Truck _____ **Year** _____

Used for _____

YOUR PROTECTION TOMORROW LIES IN YOUR ORDER TODAY

Stop and analyze now, — today, — your future equipment requirements. Analyze in the light of two imperative factors. First, — highway reconstruction alone, to say nothing of the vast new highway programs, involve an equipment demand that will require as much effort on the part of manufacturers as ever did the demands of war. Second, — time schedules, competition and the magnitude of the task will require equipment engineered to the utmost in capacities and production.

For these reasons, sound, far sighted policy dictates that, — to be assured that the most modern equipment (the finest in high production Engineered Design will be on your jobs when you want them) — your order should be placed now for future delivery—and, of course, placed with Butler.

BUTLER
BIN COMPANY
WAUKESHA, WISCONSIN

EASY-TO-USE POZZOLITH
PROVIDES GREAT DURABILITY, STRENGTH

IMPORTANT benefits for the ready-mixed dealer, contractor and owner resulted from the use of Pozzolith Concrete in the construction of this fertilizer plant.

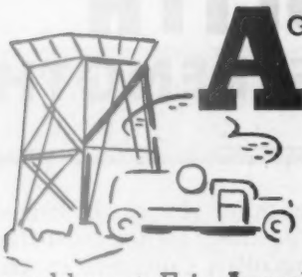
In addition to providing concrete with new standards of durability, strength, watertightness and placeability, Pozzolith, Cement Dispersion, eliminates the headaches and added expense of handling 3 or 4 kinds of *special* cement. By using Pozzolith with the M.B. automatic dispenser you can get concrete with the desired special properties with standard Portland cement, *by simply pressing a button.*

Write for complete information on how to increase ready-mixed profits with Pozzolith Concrete.

THE MASTER BUILDERS CO.
CLEVELAND, OHIO • TORONTO, ONTARIO

Fertilizer Plant, Indiana Farm Bureau, Indianapolis, Indiana.
Archt.—W. J. Sackett & Sons, Baltimore, Maryland.
G. C.—John F. Rahn, Inc., East Chicago, Indiana.
Concrete furnished by Certified Concrete, Inc., East Chicago, Indiana.

MASTER BUILDERS



AGGREMETER is the twenty-five year old trade marked name of Erie's line of Batching Bins and Central Plants ★ From the 3 sizes of Portable Type G A plants to the largest of Semi-Portable and Permanent type Plants, Erie is prepared to meet any sand, stone, or cement storage or batching problem ★ Erie AggreMeters are built for 2, 3, 4, 5 or 6 materials in all sizes in Portable, Semi-Portable and Permanent Plants for the storage, weighing and dispensing of any bulk materials to batch trucks or truck mixers—made with 2 to 9 compartments for aggregates and cement or with separate cement bins ★ They are available for charging any batch truck or truck mixer from 1 to 7 cu. yds. ★ Plan your AggreMeter needs today—set aside some U. S. Bonds for purchase later ★

Write today for the complete details to

ERIE STEEL CONSTRUCTION CO.

659 GEIST ROAD ★ ERIE, PA.

ERIE

AGGREMETERS

BUCKETS ★ TRAVELING CRANES

PORTABLE CONCRETE PLANTS

Make 6" to 48" CONCRETE PIPE with ONE Machine

Produce Pipe Profitably

Universal's "All-Purpose" Machine produces Concrete Pipe in all sizes from 6" to 48"—and shows you a worth-while profit. With a tamping capacity of 680 strokes per minute, your product is more dense, durable, finished in appearance. We can also outfit you for making larger sizes, up to 135".

Write today for Catalog and Details.

UNIVERSAL Trade Mark

CONCRETE PIPE CO.

Columbus 15, Ohio

CONCRETE BURIAL VAULTS

America's Finest Molds and Lowering Device

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TERRITORY FRANCHISES

BERG VAULT SYSTEM

BERG VAULT CO.

EQUIPMENT DIVISION
1620 LUCAS HUNT RD.
ST. LOUIS, MO.

NAT-ALOY WIRE CLOTH

☒ VOTE "YES"

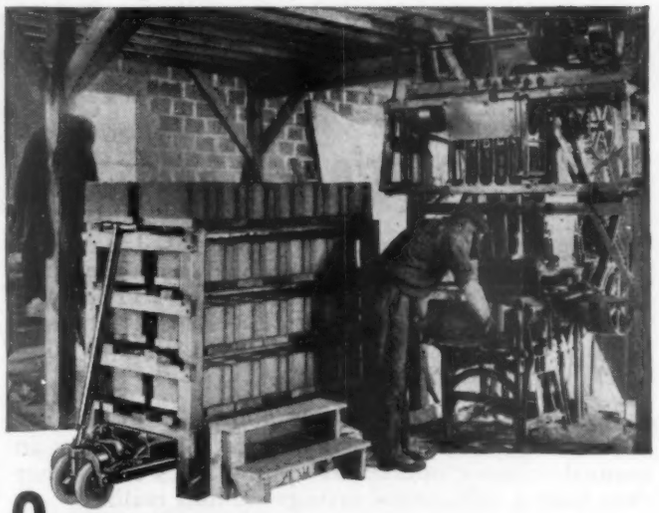
For this dependable, non-crystallizing, long-wearing Screen Cloth with "Nat-Aloy" Lock Crimp Meshes.

"IT'S THE PEOPLE'S CHOICE"

among profit-wise producers for precision separation and economical operation.

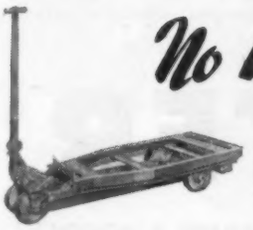
Stock shipments in all widths and all meshes. . . . Write for catalog No. 55.

NATIONAL WIRE CLOTH CO., INC.
252-270 W. FAIRFIELD AVE. — ST. PAUL, MINN.



ONE MAN HANDLES 48 BLOCKS . . .

No Breakage!



Yes, *one man* with a Barrett Lift-truck handles 48 of these standard concrete blocks 8" x 8" x 16" (or 32 of the 8" x 12" x 16" size). Holding the Lift-truck handle in any position, he raises the load with a single downward sweep. For lowering, he steps on the release pedal . . . and the load settles gently to the floor under control of a hydraulic check.

Barrett Lift-trucks Cushion the Ride

Blocks are moved from machine to curing room and through storage without breakage, protected from jolts and jars by super spring frame and rubber tires. Other features include Hyatt bearings . . . Zerk lubrication . . . and four-wheel construction. The initial cost is low—maintenance, almost nil. Ask a Barrett engineer for a demonstration of Lift-truck performance, or write for illustrated circular.

and for electric drive . . .

THE POWEROX!

Cuts handling time and effort to an absolute minimum. Hand lift—electric drive. Loads are raised with a few short strokes of truck handle. Forward and reverse motion of truck is electric, controlled by push buttons. Automatic brake, dual motors, rear wheel drive. PowerOx provides real economy without a large investment. Write for details today!

BARRETT-CRAVENS COMPANY
3251 West 30th Street • Chicago 23, Illinois

Representatives in All Principal Cities
Canadian Licensee: S. A. Armstrong, Ltd., Toronto

Barrett Handling Equipment

BARRETT

ONE MAN DOES MORE THAN 3 OR 4 . . . WITH A BARRETT

HYSTERS *do the job right*

3 bales per trip - - 7 bales high

Moving and storing heavy, baled hemp used to require a gang of 20 to 25 men at the Galva Warehouse Company, Galva, Illinois. Then HYSTER 20 Fork Lift Trucks took over—2 trucks, 2 drivers and 2 helpers—doing the entire job from car unloading to high stacking. And doing it faster.

HYSTERS handle these 600-800 pound bales with ease and efficiency—utilizing space formerly lost in manual stacking operations—piling bales one higher than before. All-around savings are thus realized.

This sturdy truck will lift, transport and tier *any materials* in unit loads to one ton. Streamlined, with trunnion steer wheel and pneumatic tires, the 20 operates in crowded quarters, up and down ramps, over any surface. It doubles output while it slashes costs. Write for details.

HYSTER
FOR ANY LIFT OR PULL

Pioneer manufacturers of mobile materials handling machines: fork lift trucks, crane trucks and straddle trucks. All gasoline powered; all pneumatic tire mounted.

845-71

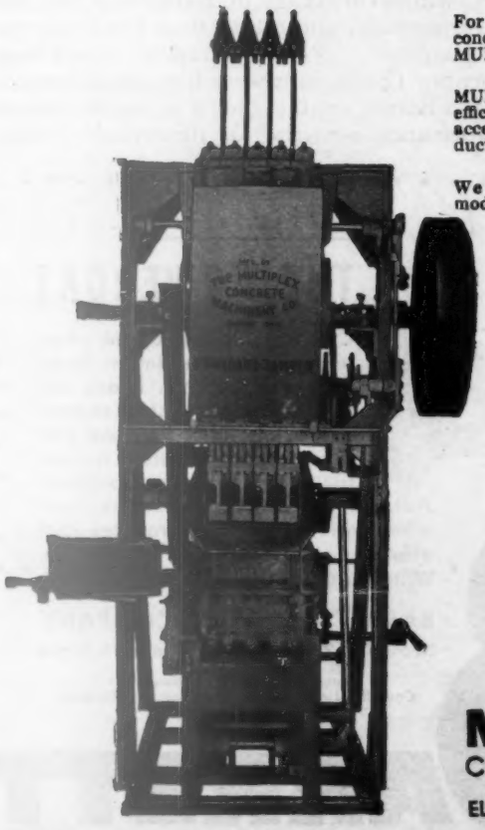
HYSTER Company

2926 N. E. CLACKAMAS STREET, PORTLAND 8, OREGON

1826 NORTH ADAMS STREET, PEORIA 1, ILLINOIS

BRANCH OFFICES: 221 N. LaSalle Street, Chicago 1, Ill.; 90 West St., New York 6, N. Y.; 1022 Denrike Bldg., Washington 5, D. C.; 233 Ninth St., San Francisco 3, Calif.; Masonic Bldg., New Orleans 12, La.; 2219 Fourth Avenue, Seattle 1, Wash.; 2700 Santa Fe Ave., Los Angeles 11, Calif.; 215 Euclid Ave., Cleveland 14, Ohio; 211 Farnsworth Bldg., Memphis 3, Tenn.

MULTIPLEX Machines For Postwar Profits



For a Quick "Take-Off" and sustained pace in concrete block output, reserve one of the MULTIPLEX *high-speed* machines.

MULTIPLEX offers a wide variety of super-efficient mixing equipment, with all types of accessories necessary for economical mass production.

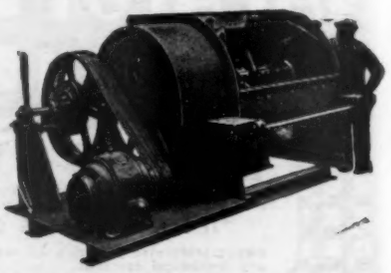
We can recommend MULTIPLEX units for modernizing *your* plant and enlarging its capacity.

Our universal type MULTIPLEX Standard Tamper for making plain and stripper, or face blocks, on one base. Easily convertible as business expands. Supplied with 4-bar or 8-bar tamper, either power or hand operated.

Write for Booklet describing the MULTIPLEX complete line of concrete mixing equipment, including Double and Single Hand Press Strippers, Power Press Strippers, and Super-Tampers.

MULTIPLEX
CONCRETE MACHINERY CO.
Frank Muenzer, President
ELMORE • OHIO

The MULTIPLEX Flue Block Machine makes ventilated, solid or lightweight units, including all attachments for ventilator and stove pipe openings.



MULTIPLEX Multi-Mixer with reverse screw-type action insures fast and thorough mixing of every batch. Side, end or bottom discharge.

MORE PROFITS *for both*

When you supply customers with Ready-Mixed concrete, made with Medusa "Medco" High Early Strength Cement, you can make more profits . . . but that's only part of the story, for the contractor with a rush job saves time and money since this concrete attains 5 to 7-day strength in 24 hours and that makes more profits. Why not start supplying "Medco" Ready-Mixed Concrete now, looking forward to those days of rush orders?

MEDUSA MEDCO HIGH EARLY STRENGTH

MEDUSA
PORTLAND CEMENT CO.
1036 MIDLAND BUILDING
DEPT. A • CLEVELAND 15, OHIO

Get up-to-date on TRUCK MIXERS Send for NEW JAEGER CATALOG!

Shows you the latest advances in design, mounting, power transmission, water control, speed of charging and discharging and "Dual-Mixing" that put these Jaeger "Speed Merchants" 5 YEARS AHEAD of any other truck mixer in the field. Catalog TMH-5 gives full details. Ask for your copy today.

"HI-DUMP" Models in 2, 3, 4½ cu. yd. sizes

"LOW CHARGE" models to 8 cu. yds.

THE JAEGER MACHINE CO. 602 Dublin Ave. Columbus 16, Ohio

REGIONAL OFFICES: 8 E. 48th St. NEW YORK 17, N. Y. · 226 N. LaSalle St. CHICAGO 1, ILL. · 235-38 Martin Bldg. BIRMINGHAM 1, ALA.

You will sell your
Surplus equipment
Faster through the
Pit & Quarry
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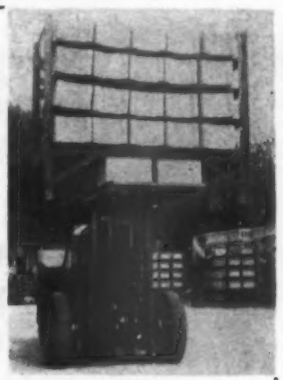
Send for Our Rate Card

The
Power Lift Truck

Ericksons have stamina, power, speed and maneuverability. Big pneumatic tires on drive wheels. No paved runways required. All steel welded construction. Speedy hydraulic platform raiser. Simple controls. Write for complete details.



ERICKSON

LIFT TRUCKS, PLATFORM TRUCKS, HIGH AND LOW LIFT FORK TIERING TRUCKS.

For Fast Movement of Large Quantities of Block

ERICKSON SPECIAL EQUIPMENT MFG. CO.
109 14TH AVE. N. E. • • MINNEAPOLIS, MINN.

The "Quinn Standard"
FOR CONCRETE PIPE

The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 30 years' service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that Quinn pipe forms and Quinn mixing formulas combine to produce the finest concrete pipe at lowest cost.

Quinn Heavy Duty Pipe Forms

For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for any diameter pipe from 12 to 84 inches—tongue and groove or bell-end pipe at lowest cost.

WRITE TODAY

Complete information, prices and estimates sent on request. Also manufacturers of Quinn Concrete Pipe Machines.

QUINN WIRE & IRON WORKS 1822 12th ST. BOONE, IA.

Victory!

14 AUGUST 1945

"On Earth Peace . . . Good Will toward Men"

The excellence of war production that won four Army-Navy "E" awards is now devoted to the design and manufacture of new and improved concrete products plant equipment.

Stearns machines—block makers, mixers and material handling skip loaders—will solve any post-war problem you may have. Stearns engineers and dealers will continue to give you the benefit of their mature experience. Make use of them.

You may be sure that immediately we are relieved of war contracts (and this should be soon), we shall consider it our first duty to speed the delivery of present orders. We consider this a definite responsibility.

BEFORE BUYING, CONSULT STEARNS!

STEARNS

STEARNS MANUFACTURING CO., INC. • ADRIAN, MICH.

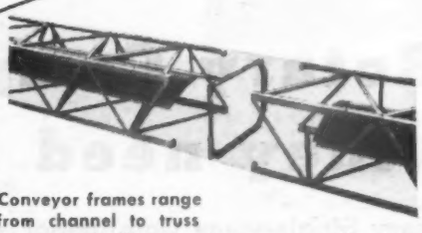
GENE OLSEN, PRESIDENT

How 4-WAY B G Engineering

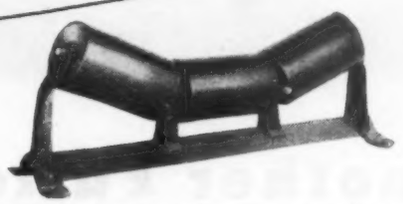
PROVIDES THE PROPER COMBINATION FOR PEAK CONVEYING EFFICIENCY

Terminals are factory assembled as units, ready for bolting to conveyor frame. Field assembly of miscellaneous pulleys, bearings, and other parts, is completely eliminated. Barber-Greene terminals are available in a wide range of types, sizes, and horsepower.

This take-up unit, for instance, is standardized in the same manner as the head-end drive. B-G *pre-engineered* equipment is used in some of the longest conveying systems in the world — for processing, storing and reclaiming.



Conveyor frames range from channel to truss type, in depths to meet span requirements. Lengthening a conveyor is merely a matter of adding *standardized* sections. Conveyor system is easily revamped — terminal units attach directly to any section.



Carriers and return rollers are properly designed to furnish maximum strength with minimum weight. All steel, jig-welded construction insures correct alignment. Choice of troughing, flat, self-aligning, or rubber impact carriers—with roller, ball or plain bearings.

1. **PRE-ENGINEERING** by Barber-Greene assures selection of the right equipment for your particular job.

2. **PRE-FABRICATION** of conveyor units saves erection time — guarantees correct assembly and belt alignment.

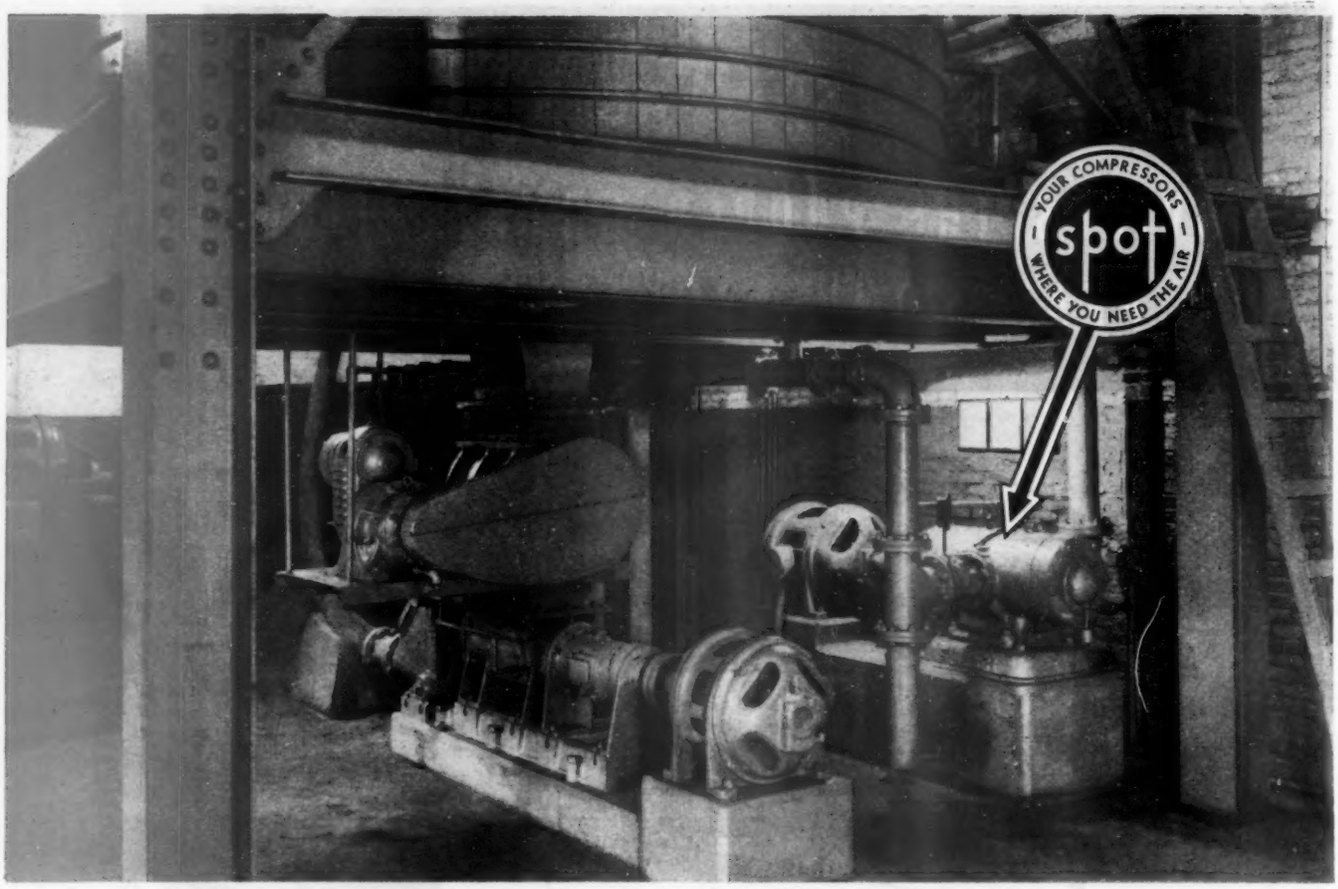
3. **STANDARDIZATION** permits interchangeability — makes installation, alterations and moving speedier.

4. **VARIETY OF EQUIPMENT** gives you the choice of sizes and types that best meet your requirements.

When you have a material handling problem, call in B-G engineers to help you. Barber-Greene Company, Aurora, Illinois.

45-81B

Barber-Greene B G *Constant Flow Equipment*



Another Fuller Rotary Compressor "spotted" where they need the air

Write for Bulletin C-5, illustrating and describing Fuller Rotaries.

This Fuller Rotary Single-stage Compressor was installed by a producer of pulverized phosphate rock to supply air to the Fuller-Kinyon Pump for conveying material to a mixer bin.

Compressed air was available from a central compressor station but at a very much higher pressure than needed for this particular purpose. So rather than use air through a reducing valve with the attendant losses, it was decided to install a compressor to discharge directly to the pump. By this means the compressor develops the exact pressure required by the system, assuring maximum efficiency at all pumping conditions. This results in considerable saving in power, costly transmission lines with their attendant expense, friction losses and line leakage. In other words, a compressor "spotted" for air where and when needed and at pressures to do the work most economically and efficiently.

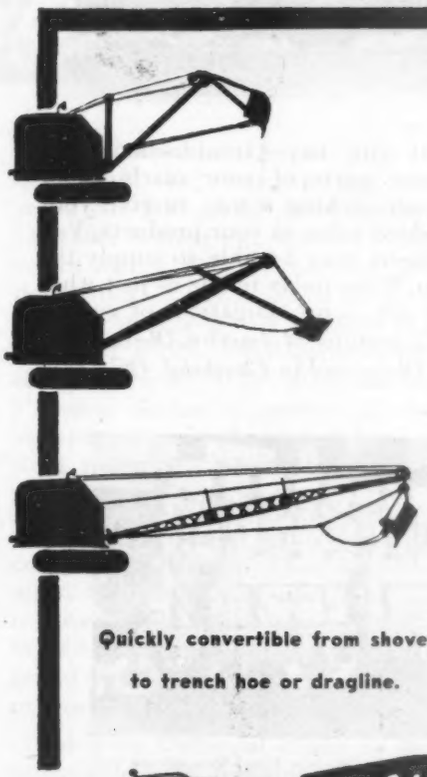
FULLER COMPANY, CATASAUQUA, PA.

Chicago 3 · 1144 Marquette Bldg.
San Francisco 4 · 421 Chancery Bldg.
Washington 5, D. C. · 618 Colorado Bldg.

FULLER COMPANY

FULLER-KINYON, FULLER-FLUXO AND THE AIRVEYOR CONVEYING SYSTEMS . . . ROTARY FEEDERS AND DISCHARGE GATES . . . ROTARY AIR COMPRESSORS AND VACUUM PUMPS . . . AIR-QUENCHING INCLINED-GRATE COOLERS . . . DRY PULVERIZED-MATERIAL COOLER . . . AERATION UNITS . . . MATERIAL-LEVEL INDICATORS . . . MOTION SAFETY SWITCH . . . SLURRY VALVES . . . SAMPLERS

C-116



Quickly convertible from shovel to trench hoe or dragline.

Here's the truck and crawler assembly of a Buckeye Clipper. Its rugged construction—simple design—assures a far greater service life—less time out for repairs.

BIG — treads are 22 inches wide with 9 inch pitch!

STRONG — both treads and sprockets are of heat-treated, alloy steel!

The crawler assembly — built in its entirety in the Buckeye shops — is typical of the superior design and construction found throughout the Clipper. Crawler is the well-known Buckeye patent, non-clogging, self-cleaning type. Tapered roller path below swing gear supports weight of machinery deck — stress and side play are removed from center pin.

Added to the inbuilt qualities of stamina, high productivity and low cost operation is the exclusive "Mevac" system — metered vacuum power control — similar to that used for years on big highway trucks. "Mevac" reduces operator fatigue to a minimum — all shovel functions respond to a flick of the operator's wrist on the short "Mevac" control handles. Send for 24-page illustrated booklet, "The Age of the Clippers," and learn how these easy-to-operate ½ and ¾ yard shovels can help you cut costs in your postwar operations.

ARMY NAVY

Built by Buckeye ®

Buckeye Traction Ditcher Co., Findlay, Ohio

Convertible Shovels

Trenchers

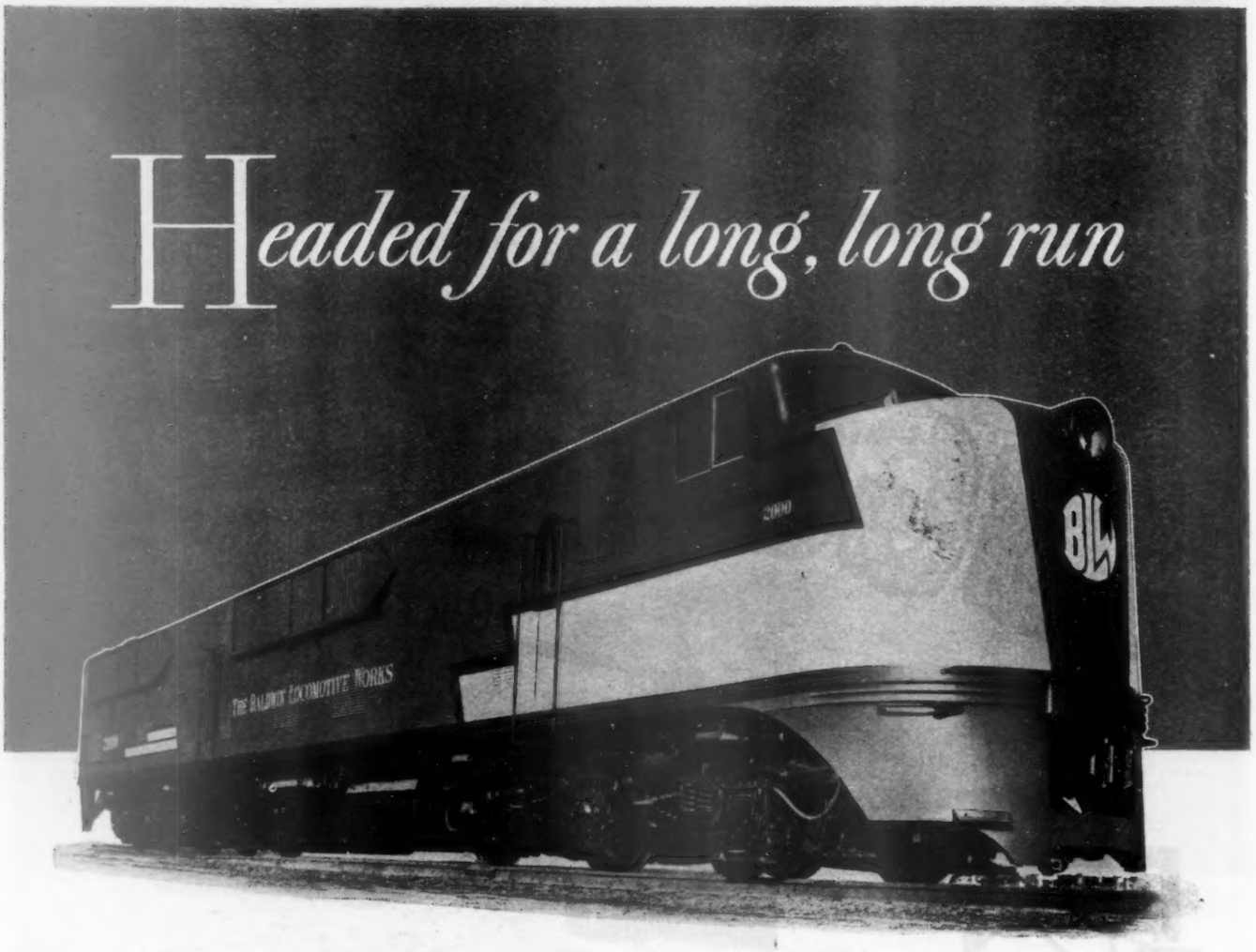
Tractor Equipment

Road Wideners

R-B Finegraders

Spreaders

Headed for a long, long run



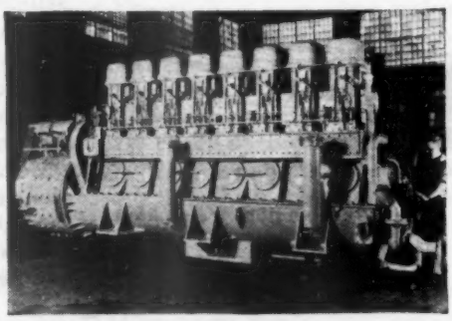
In their first Main Line Diesel, the Baldwin Locomotive Works have incorporated their long and successful experience in building rugged, sturdy switchers powered by Baldwin-built Diesel engines.

The longer life and lower maintenance costs obtained on the first liners Baldwin had processed with PORUS-KROME led them to standardize on this type of liner . . . and now every Baldwin Diesel engine coming off the production line has the greater reliability assured by PORUS-KROME. Of course, their first Main Line Diesel has PORUS-KROME applied to its liners, too, and thus it is headed for a long, long run of reliable operation.

PORUS-KROME is hard, pure chromium applied by the patented Van der Horst process. It has tiny pores and channels which serve as reservoirs for lubricating oil, feeding it back as needed. It greatly decreases the wear on bearing surfaces, and, when applied to cylinder walls, it multiplies their life 4 to 20 times . . . and the life of conventional rings 3 to 5 times.

In addition to providing a "long life" cylinder wall surface, PORUS-KROME has many diversified applications. If you have troublesome wear problems on any parts of your machines or equipment, or are seeking a way to give your customers an added value in your products, Van der Horst engineers may be able to supply the solution for you. Write today telling us just what your problems are . . . no obligation, of course.

Van der Horst Corporation of America, Olean, N. Y.
Plants in Olean and in Cleveland, Ohio



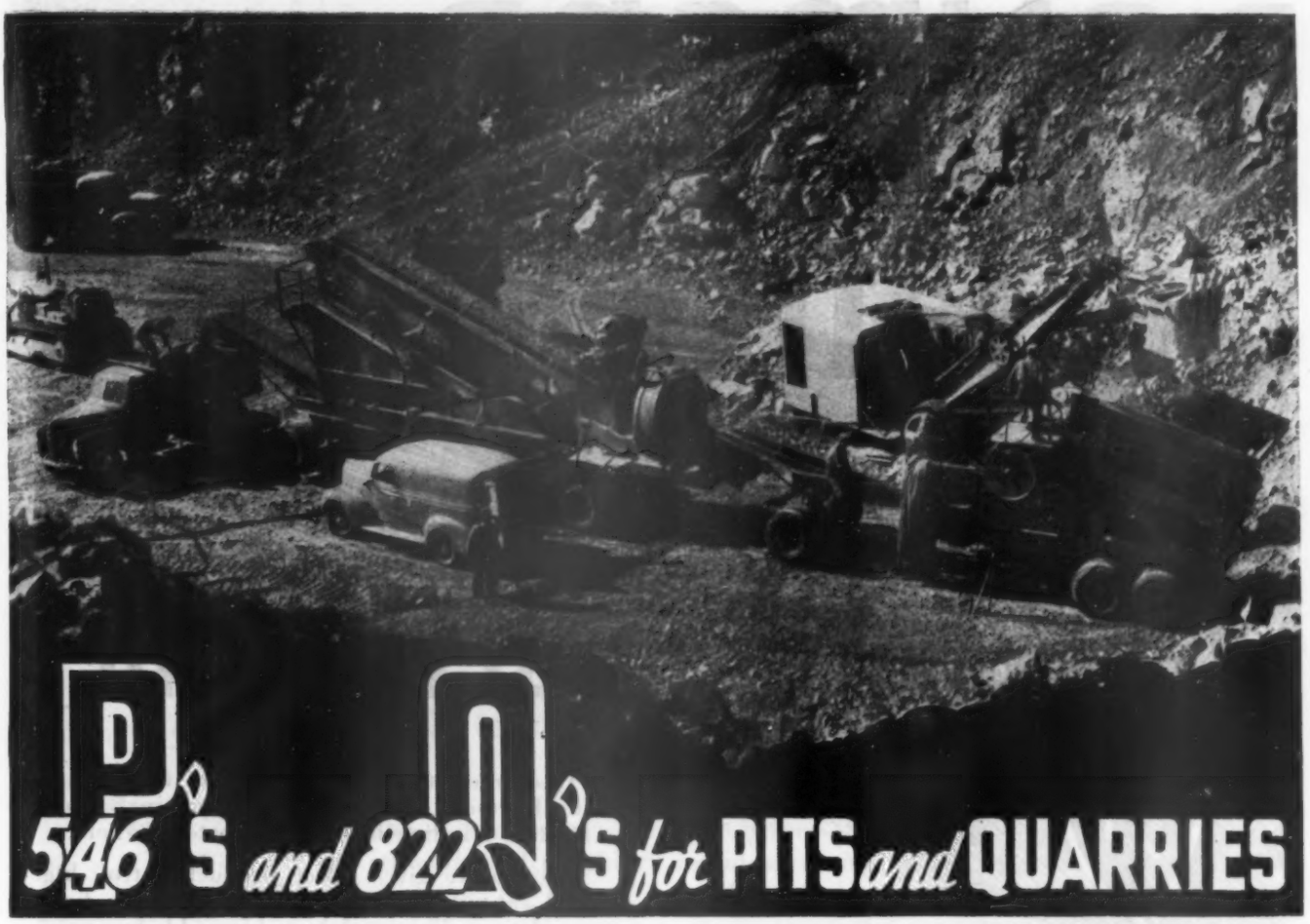
Two of these 1000 hp. Baldwin Diesel-Westinghouse generator units make up the power plant of the Baldwin Main Line Diesel. Cylinder liners are PORUS-KROME processed.

PORUS - KROME

Good for the Life of your Engines

VAN DER HORST

AN AFFILIATE OF DRESSER INDUSTRIES



P's and Q's for PITS and QUARRIES

A general view of Gallager-Nelson's Universal 546-P primary crushing unit and "800" secondary crushing unit forming the "822-Q" quarry plant shown working near Polo, Ill. Note the close-coupled compactness of this electrically-powered rock reduction plant.

Gallager-Nelson of Oregon, Ill., know their P's and Q's. Having some time ago purchased a Universal No. 800 gravel plant consisting of a 40″x 22″ roller bearing roll crusher, 4′ x 12′—2½ deck screen with a 30″ feed conveyor on a pneumatic tired truck, *it was a simple matter to convert this unit into an 822-Q rock crushing plant* by the addition of a No. 546-P primary unit. This unit consists of a 20″ x 36″ WRB jaw crusher, a 36″ x 8′ apron feeder, a grizzly and by-pass, a 30″ under-conveyor—all mounted on a pneumatic tired truck. We repeat—Gallagher-Nelson know their P's and Q's.

An inbuilt feature of Universal gravel and rock crushing, screening and loading plants long recognized by contractors and public works officials is the ease with which new standardized units may be added to increase capacity, to change over from gravel to rock crushing or to add washing or other processing not included in the original plant.

Ask your Universal dealer to show you these exclusive design features common only to Universal-engineered equipment.

Close-up of the 546-P primary unit. Electrically-driven, it consists of a 20″ x 36″ WRB jaw crusher, a 36″ x 8′ apron feeder, a grizzly with by-pass and a 30″ under-conveyor.

UNIVERSAL ENGINEERING CORPORATION

630 C AVE. West
Cedar Rapids, Iowa

UNIVERSAL

ROCK AND GRAVEL CRUSHERS, CRUSHING ROLLS, HAMMER MILLS, COMPLETE CRUSHING AND SCREENING PLANTS, WASHING PLANTS, ASPHALT PLANTS, SPREADEROLLERS.

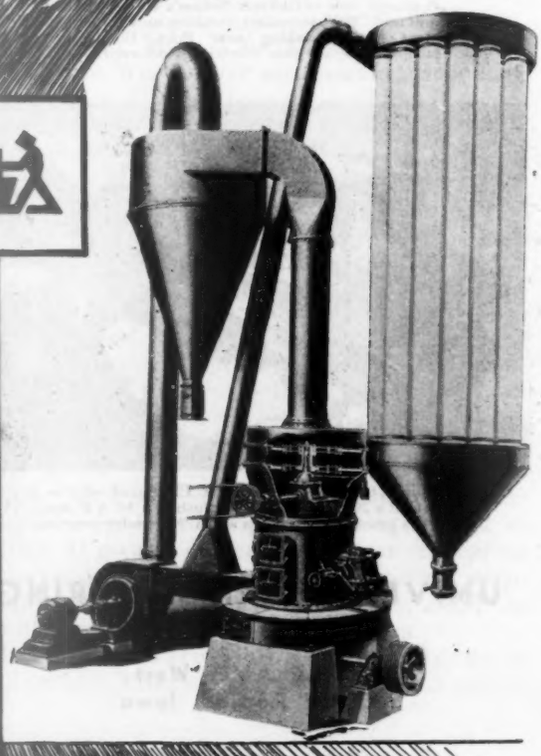
RAYMOND Whizzer Type ROLLER MILL

IT is largely the *whizzer separator* that is making the Raymond Roller Mill so increasingly popular for fine grinding in the rock materials field.

This feature gives closer product-control, higher mill capacities and greater flexibility in fineness regulation. The revolving whizzer blades are operated independent of the mill through an individual motor with variable speed transmission.

Simply changing the speed of the whizzer provides a wide range of classification from 60% minus 100-mesh to 99.9% passing 325-mesh. This is an advantage in custom grinding, where different grades of products are ground in the same mill.

Whizzer-equipped Roller Mills are giving economical and uniform production on such materials as limestone, burnt lime, barytes, bentonite, kaolin, magnesium oxide, phosphate rock, bauxite and talc.

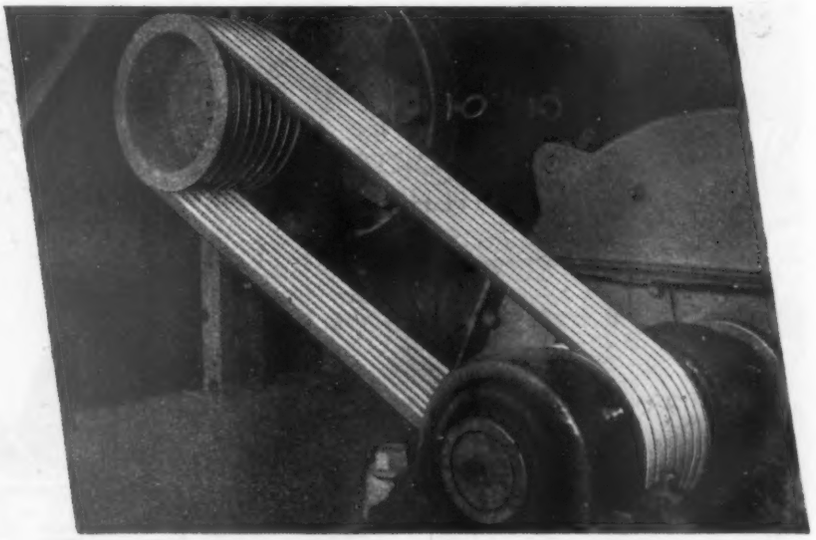


Whizzer Separators may be built integral with new Raymond Roller Mills, Imp Mills and Automatic Pulverizers . . . or furnished as a motor driven unit for attachment to your present Raymond Mill. Ask for details.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1321 North Branch St. Chicago 22, Illinois

Sales Offices in Principal Cities
Canada: Combustion Engineering Corp., Ltd., Montreal

Fineness instantly adjustable while running



No "Pre-War" Belts
EVER Gave the Service that is
NOW Being Delivered by Your *Standard GATES VULCO ROPES!*

Here is the Reason:— Good belts were built before the war but none of them had the strength and durability found necessary on army tanks, tractors and self-propelled big guns. Gates developed these greatly superior V-belts for combat service—and here is why this fact is important to you NOW:—

Every improvement developed by Gates for U. S. combat units has been added, day by day, to the quality of the standard Gates Vulco Ropes which have been delivered to you.

Here is one rare instance in which improvements developed primarily for army combat use can be passed on to you immediately—and there are, of course, good reasons why Gates has not been called upon to withhold these important improvements from industrial V-belt users.

Efficient production in our nation's industrial plants is a prime essential to our winning of the war—and better V-belts than ever before have been urgently needed to keep machines going on the forced-draft, war production schedules that have had to be maintained 24 hours a day!

That is why Gates has been able to embody in the standard Gates Vulco Rope every V-belt improvement which Gates specialized research has developed for use on the Army's motorized equipment—and that is why you are finding that your standard Gates Vulco Ropes are today giving you better service than any V-belts that were built before the war.

All Gates V-Belts are Built with *The Patented*

Gates THE MARK OF SPECIALIZED RESEARCH

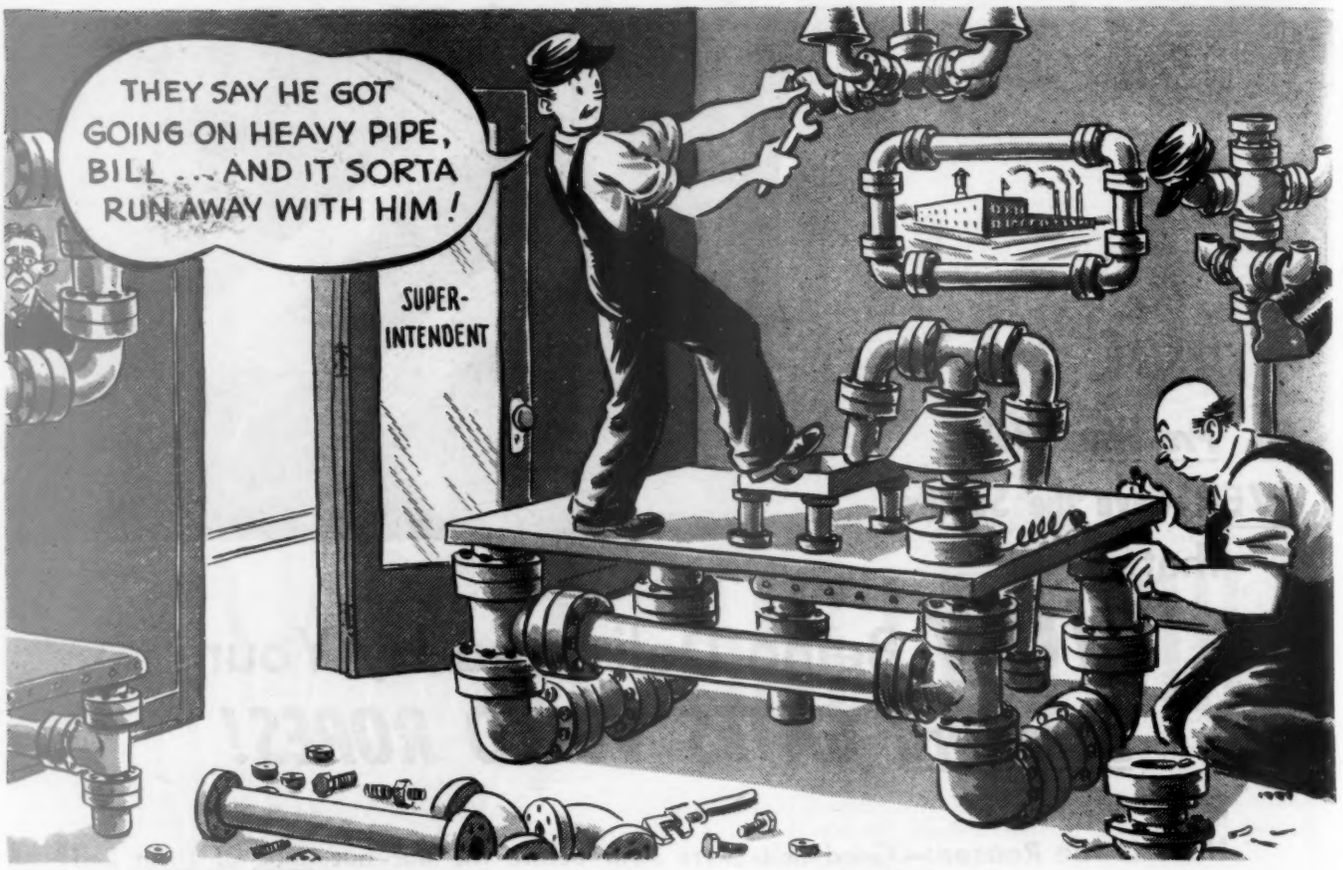
459

THE GATES RUBBER COMPANY

Engineering Offices and Jobber Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO 6, ILL., 549 West Washington. NEW YORK CITY 3, 215-219 Fourth Avenue. ATLANTA 3, GA., 521 C. & S. Nat'l Bank Bldg.
LOS ANGELES 21, CAL., 2240 E. Washington Blvd. DENVER 17, COLO., 999 S. Broadway. DETROIT 2, MICH. 223 Boulevard Bldg.
PORTLAND 9, ORE., 333 N.W. 5th Ave. DALLAS 2, TEXAS, 1710 N. Market St. SAN FRANCISCO 3, CAL., 170 Ninth St.



Have YOU gone too far with heavy pipe?

WHEN we say heavy pipe we don't mean the "Extra Heavy" kind. We just mean the ordinary, everyday "Standard Thickness" pipe that is used for a multitude of services. In relation to *most* of the purposes it serves in *most* plants, it *is* heavy —far heavier than needed!

Miles of this pipe are used for that broad middle range of low and moderate pressure services—services like those listed here. Yet there is a pipe, weighing about half as much, that can handle any of these requirements with strength and service life to spare—a pipe which can often be installed at half the cost of the heavier pipe it so well replaces.

This pipe is Taylor Spiral!

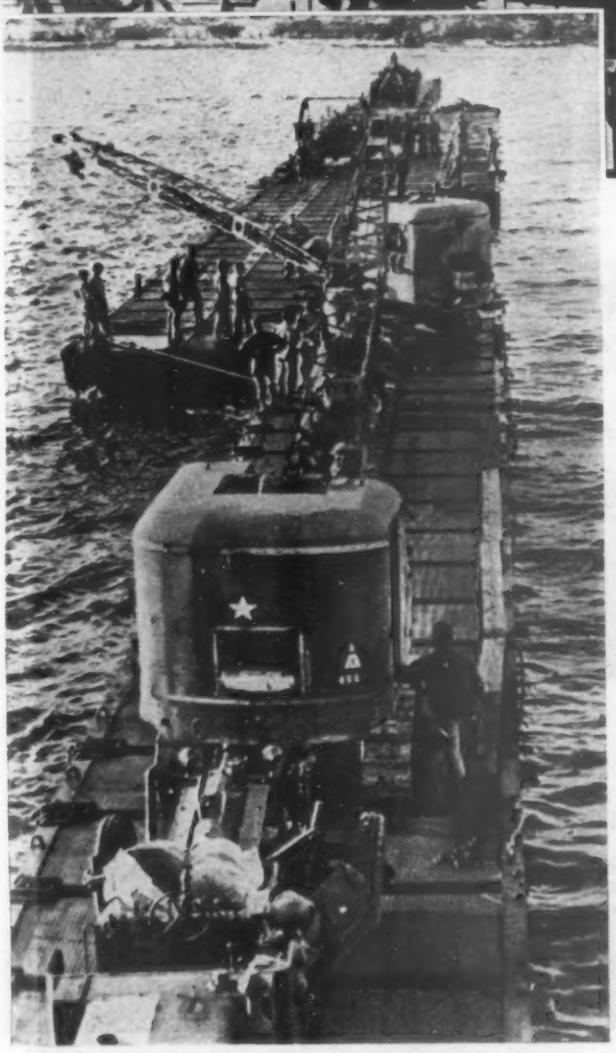
When you use this light but remarkably strong pipe you not only save dollars; you also conserve vital steel. Switching to Taylor Spiral for services like those listed is made easy by the range of sizes and variety of fittings. Thicknesses range from 18 to 6 gauge; sizes from 4″ to 42″; joint lengths to 40 ft. All types of end joints and couplings, all kinds of fittings and "specials" or fabricated assemblies are produced by Taylor Forge, assuring a complete service with undivided responsibility.

TAYLOR FORGE & PIPE WORKS

General Offices & Works: Chicago, P. O. Box 485 ★ New York Office: 50 Church St. ★ Philadelphia Office: Broad Street Station Bldg.

CHANGE TO TAYLOR SPIRAL PIPE FOR:

- High and Low Pressure Water Lines
- Low Pressure Steam and Air Lines
- Steam and Diesel Exhaust Lines
- Vacuum and Suction Lines
- Blower Piping
- Sand and Gravel Lines
- Industrial Gas Lines
- Oil and Gas Gathering Lines
- Swing Pipe
- Spray Pond Piping
- Hydraulic Mining
- Dredge Lines



Here's THAT OSGOOD MODEL 200 YOU'VE WANTED!

Here are just three of the more than 1400 Osgood Model 200's produced for the U. S. Engineers alone. One is erecting a temporary bridge to help rebuild a war-ravaged city in Europe. Two others are moving into a Pacific island to help build one of the air fields from which planes will put the "finishing touches" on Japan.

From battlefronts all over the globe, the story is the same . . . Osgood equipment, powerful and dependable, really pitched into difficult wartime assignments. We can't fill the civilian demand for Osgood equipment *yet*. But when restrictions are lifted, you'll find that the experience gained by Osgood engineers in producing this equipment for war will result in even better equipment for you . . . more powerful and dependable and more economical to operate. Plan now to profit on those postwar projects by using Osgoods. You'll find the complete line well worth asking about now!

THE GENERAL EXCAVATOR COMPANY
CRANES, DRAGLINES AND SHOVELS
DIESEL, GAS, ELECTRIC

Associated with The General Excavator Company

OSGOOD — CRANES-SHOVELS — MARION OHIO U.S.A. — OSGOOD GENERAL

THE OSGOOD COMPANY • MARION, OHIO

ARMY E NAVY

OSGOOD
SHOVELS, DRAGLINES
CRANES

What's a Truck for, anyway?...

Your truck is mechanical equipment in your business. As such it *makes or loses money* for your business every day you own it. The truck that costs least *at work* is the one to use.

As with any production machine—the *longer* your truck lasts—the *harder* it works—the *less it costs per unit of output*—then the more money it makes for you.

That's why there's nothing like a Mack.

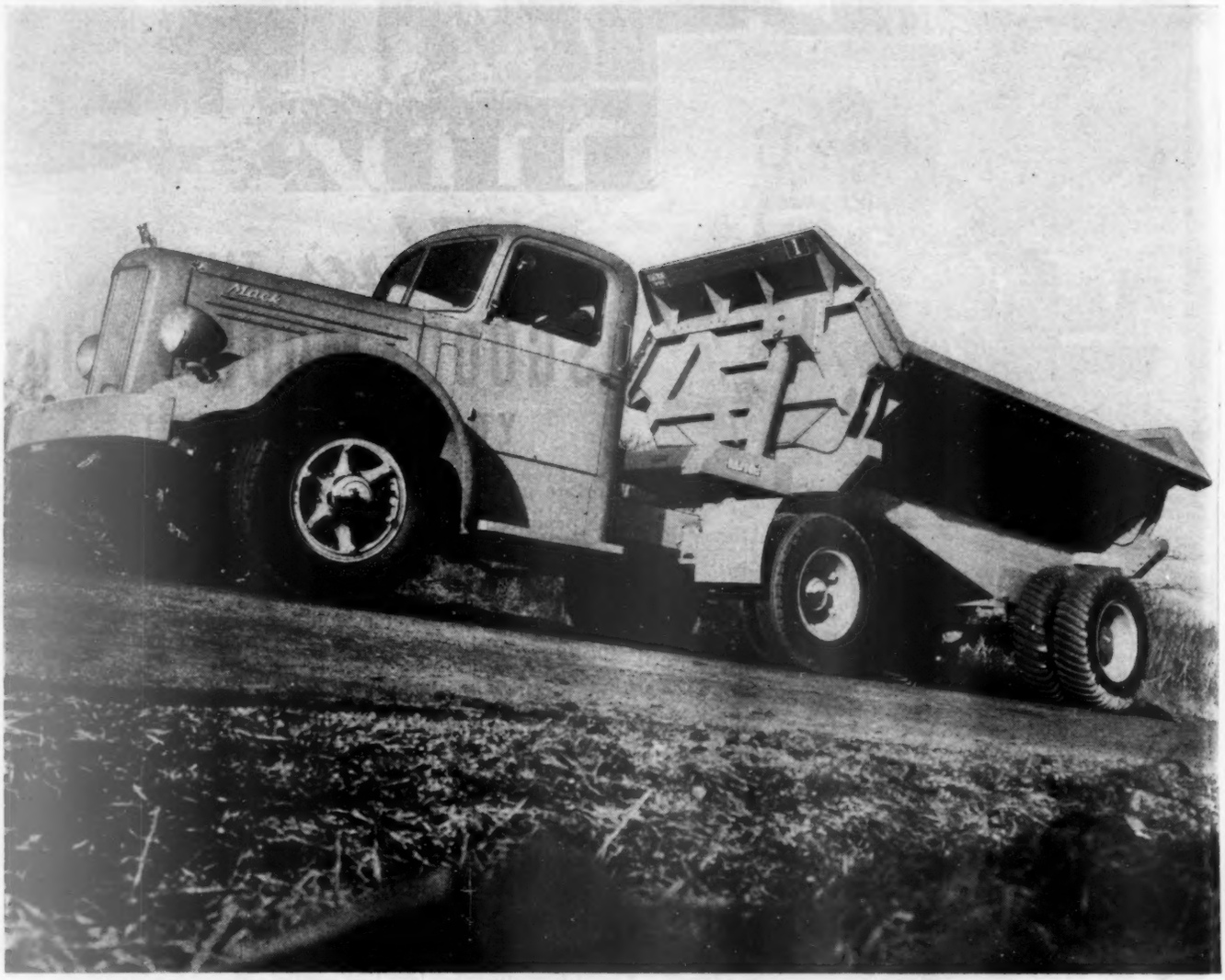
For the important thing about a Mack is not its name or its size or its weight or its price when new.

The important thing is simply that a Mack is built to work harder, longer, and at lower per-day cost, than any other truck in the world.

The reasons why it can do this, the Mack owner may never see—such as Mack wristpins finished to one ten thousandth of an inch—one of many Mack quality processes that insure better fit, and greater durability at work.

But the reasons are *there*—in every Mack truck. And the results are on the records of American business since 1900.

Macks have been *making money* for their owners for over 45 years. Now is the time to find what Macks can do for you.



★ BUY THAT EXTRA WAR BOND TODAY ★

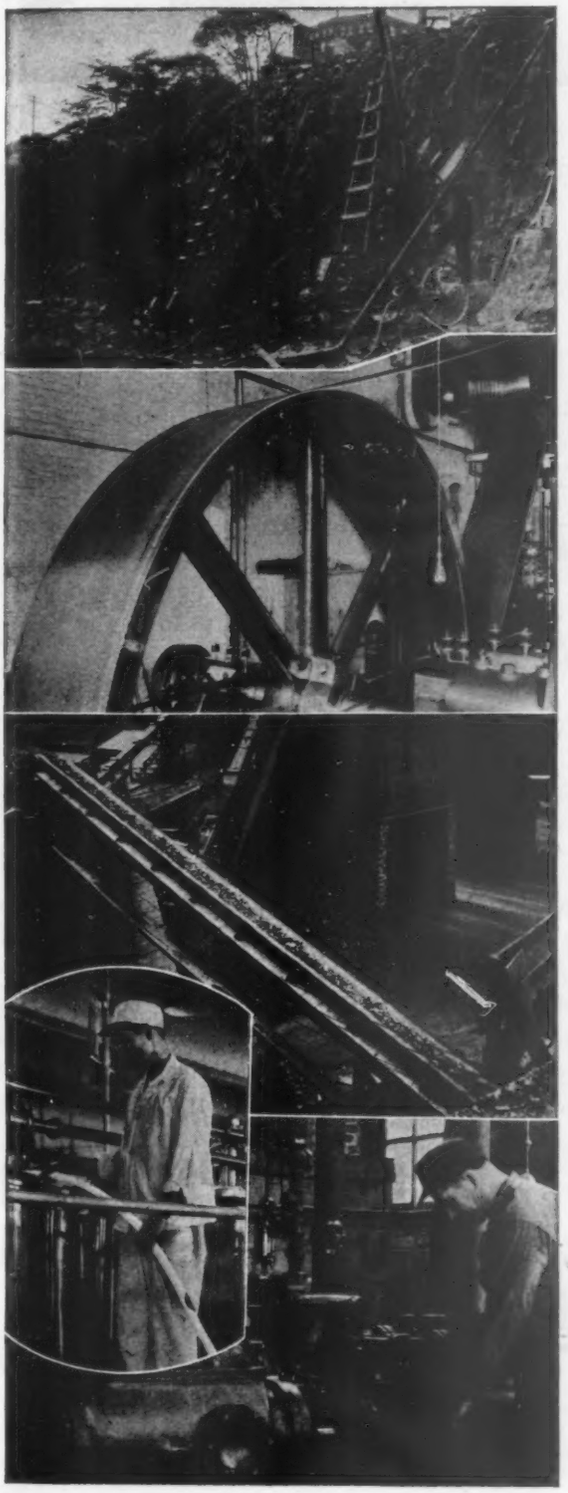
Mack Trucks, Inc., Empire State Building New York, N. Y. Factories at Allentown, Pa.; Plainfield, N.J.; New Brunswick, N.J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts.

Mack
TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

NEW Mack Trucks are available for essential civilian use. Ask for details.

WHAT *is your Guess?*

When desired quantities of
INDUSTRIAL RUBBER GOODS
will be available



Expectancy of big news events has kept this country on edge for many months. People venture to make a guess when the next important event will take place.

We all know restrictions are being eased—some products are again becoming available. The prospect for more Industrial Rubber Goods looks brighter. Quaker anxiously awaits the time when we can again give the type of service that our thousands of accounts normally expected and received.

Quaker, all through the war period, has steadfastly turned out Industrial Rubber Products; Belting and Hose by the millions of feet; Rod and Sheet Packings by the tons. Soon, we hope; most, if not all of our production will be available for civilian use.

It is good policy to keep on asking for Quaker —the name that stands for Quality Industrial Rubber Products.

Buy More
WAR BONDS

"If there is a way to get it done —Quaker will do it"

QUAKER RUBBER CORPORATION

PHILADELPHIA 24, PA.

NEW YORK 7 • CLEVELAND 15 • CHICAGO 16 • HOUSTON 1

Western Territory

QUAKER PACIFIC RUBBER COMPANY

SAN FRANCISCO 5 • LOS ANGELES 21

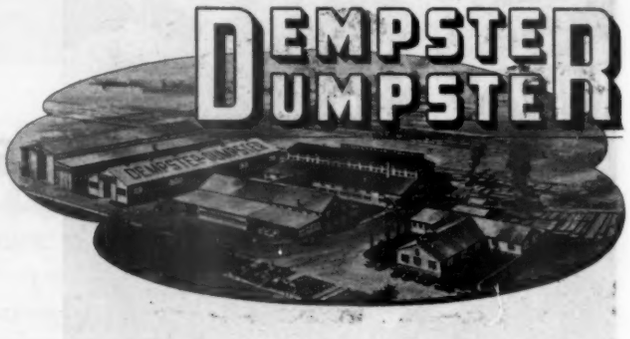
IT'S THE SURE WAY TO CUT COSTS OF PRODUCTION IN YOUR QUARRY!

★ The Dempster-Dumpster system of materials handling has been a "life-saver," so to speak, for many quarry, cement, sand, gravel and other industrial plants during recent years. This is easily understood, once you realize the big job the Dempster-Dumpster is capable of.

To see it in operation, no stretch of the imagination is necessary to convince you at once that one truck, equipped with a Dempster-Dumpster Hoisting Unit, will do the same work of 3 to 5 of your present trucks. This one truck is on the go—giving maximum service—in a never ending cycle, hoisting, hauling and dumping one loaded body of material while any required number of other bodies are being loaded. A synchronized system of haulage that saves trucks, tires, gas, time, manpower and money.

The above illustrations show clearly how the Dempster-Dumpster system works at the loading point. No tracks to lay and move around. Empty bodies are placed exactly where they will be most conveniently loaded. No time is wasted by men or equipment.

Let our engineers assist you in simplifying haulage of material in your operation. Write for completely illustrated catalog NOW. Dempster-Brothers, Knoxville 17, Tennessee.



FOR PERFECT SPREADS USE A BAUGHMAN

The machine that made LIME popular!

BAUGHMAN ALWAYS SETS THE PACE!

Here is the all-around machine you have been waiting for — put it on your truck and use it the "whole year 'round." Spreading lime is only one of the many jobs this model will do!

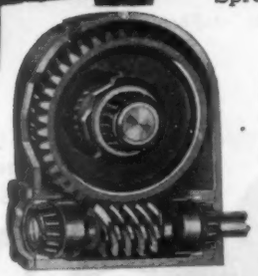
Patented and Patents Pending.

View of a 6½ ton load in a 11-foot body.

MODEL K Wide Throat Drag Chain Type

Steel Body and Undercarriage. Capacities, 5 to 15 tons. Made in 9, 11, 13, 15 and 17 lengths — and 19, 21, 23 and 25 foot lengths with sideboards.

Handles wet or dry lime. Timken straddle mounted bearings, ball and roller bearings throughout. Only two oil-sealed cases and 1 short roller chain drive. Automatic chain feed regulator. Automatic endgates — large endgate for fast dumping. New style automatic drag chain tightener with anti-wrap chain stop. Only 1 patented distributor used. Spreads from 35 to 45 feet depending upon truck speed.



View of our heavy, cut steel and bronze, 15 to 1, Gear Reduction. All gears are straddle mounted between Timken tapered roller bearings, sealed against dirt and running in a bath of oil. Simple, efficient, trouble-free — will give years of service.

Other Baughman "Hi-Speed" Equipment

Model C, Cinder and Chip Spreader
Model N, Dump Body Lime Spreader
Model P, Phosphate Spreader
Motor or Farm Tractor Drive Spreader
Model F, Flat Bed Type Spreader
Model J, Transfer Unloader or Dump
Model L, Car Unloader
Model M, Car Unloader

Ask for recommendations—we have a reliable distributor near you.

manufactured exclusively by

BAUGHMAN MANUFACTURING CO., Inc.

Factories • JERSEYVILLE, ILLINOIS

WELLMAN *Williams* BUCKETS

Longer Service... Less Maintenance

Welded construction makes the difference! Multiple Rope, Power Arm and Power Wheel and Dragline buckets, ⅜ to 16½ yd. capacities.

Send for Bulletin

THE WELLMAN ENGINEERING COMPANY

7014 Central Avenue • Cleveland 4, Ohio

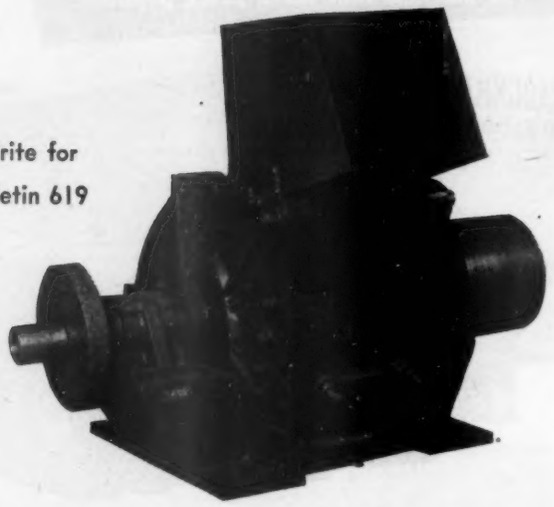
Sales and Service Agencies in Principal Cities

1 CRUSHER . . . the WILLIAMS "SLUGGER"

reduces **"ONE-MAN"** size stone to 1¼", ¾" or agricultural size in **ONE OPERATION**

Here's the all-purpose hammer type pulverizer for crushing agricultural limestone, concrete and road stone. WILLIAMS "Slugger" provides continuous, high-capacity production of uniformly sized material. Unit is extremely rugged and economical to operate. The ideal crusher for supplying a wide market demand with a small investment. Available in 7 sizes, portable or stationary models.

Write for Bulletin 619



The Williams Patent Crusher and Pulverizer Co.
802 St. Louis Ave. St. Louis 6, Mo.

Williams
OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD
PATENT CRUSHERS GRINDERS SHREDDERS

AIR SEPARATORS
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CRUSHERS
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NEW GUARANTEED
mechanical
RUBBER PRODUCTS
available from Stock
for immediate Delivery

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CONVEYOR and ELEVATOR BELTING
all widths and plys

TRANSMISSION BELTING
all widths and plys

V-BELTS
all sizes

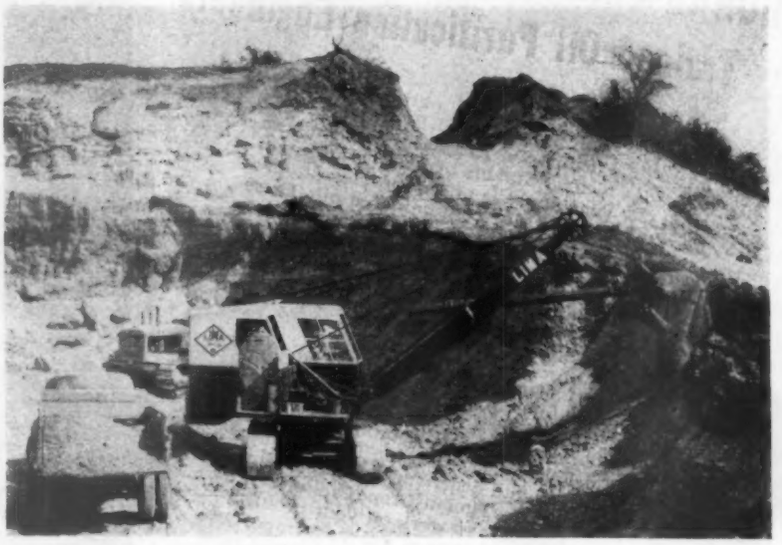
HOSE all sizes
WATER
AIR
STEAM SUCTION
FUEL

write for catalog

. . . and everything rubber for Industrial Requirements

FOR DETAILED LISTINGS SEE THE CARLYLE AD ON PAGE 187

When you buy your next ¾ yard shovel, crane, dragline or pull-shovel you can make no better choice than a LIMA PAYMASTER. The PAYMASTER is relatively light in weight yet rugged enough to withstand the most severe conditions encountered in hard digging. It is equipped with an 18' box type boom and 15' tubular type dipper handle. When equipped as a shovel the PAYMASTER can easily be converted to a crane, dragline or pull-shovel or conversely without major dismantling. Such an advantage makes the PAYMASTER an efficient tool, adaptable to many kinds of work. A LIMA shovel, crane or dragline is identified by the Diamond on the cab. The LIMA Diamond is a symbol of 75 years of quality workmanship and dependable service. Write now for a copy of bulletin No. 034C.



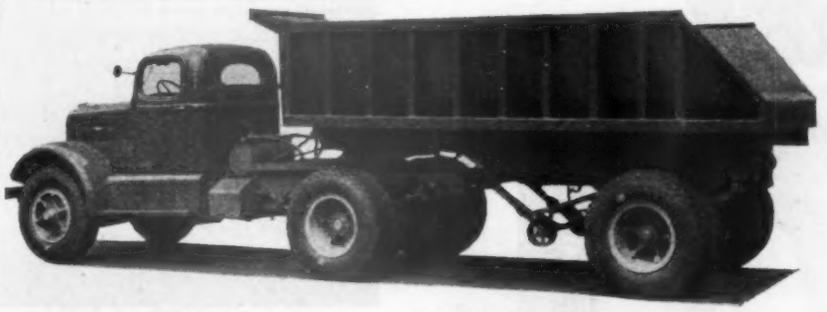
LIMA LOCOMOTIVE WORKS, Incorporated

Shovel and Crane Division **Lima, Ohio**

LIMA

CAPACITIES

SHOVELS .....¾ YARDS TO 5 YARDS
CRANES.....13 TONS TO 100 TONS
DRAGLINES .....VARIABLE



Model 5SF Semi-Trailer with 10 Cu. Yd. Rock Body

SEMI-TRAILER DUMP UNITS

WITH ROCK TYPE OPEN END OR STANDARD TAIL-GATE TYPE BODIES FOR ALL TYPES OF BULK MATERIAL HAULING ARE AVAILABLE FOR SALE TO APPROVED USERS.

COMPLETE INFORMATION FURNISHED ON REQUEST

TRUCK ENGINEERING CORPORATION

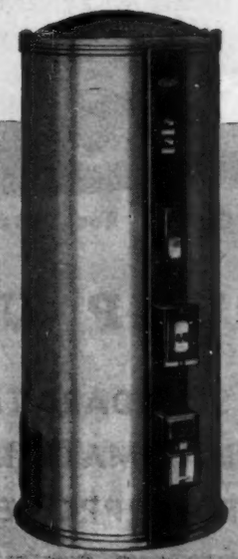
CLEVELAND 2, OHIO

HONAN-CRANE MEN Are Trained Oil Purification Engineers

Honan-Crane oil purification equipment is sold ONLY by trained Oil Purification Engineers—skilled technicians capable of making an intelligent analysis of any problem involving dirty or contaminated oil. These men are also capable of supervising proper installation of Honan-Crane equipment to give you maximum oil purification protection against acids, sludges, abrasives or other damaging contamination.

Keeping oil clean pays big dividends in reduced maintenance and increased production in the operation of Turbines, Internal Combustion Engines, Hydraulics, Machine Tools, Compressors and other industrial equipment. Put this Honan-Crane Oil Purification Engineer to work on your problem—he will be one of the most important men in your plant. A Honan-Crane Engineer will call at your convenience. Write today.

HONAN-CRANE CORPORATION
Subsidiary of Houdaille-Hershey Corporation
56 Indiana Avenue
LEBANON, INDIANA

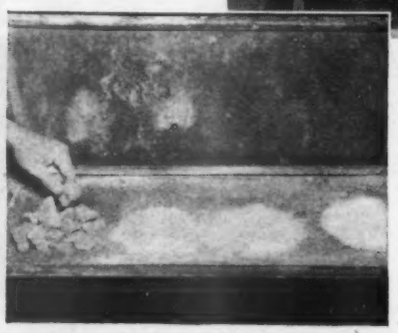


Honan-Crane has had many years of experience in the engineering and building of oil purification equipment.

MIR-O-COL Hard-Facing

Worked 200 Hours

at Gladding McBean & Co. Southgate, Calif.



—Without Resurfacing

the scraper blade in the Clearfield grinder where..

—50 Tons of Quartzite Is Ground

on each 8-hour shift to make silica brick. The fine grains (shown above) cut non-protected scraper blade edges below tolerance in two weeks. With MIR-O-COL Hard-Facing No. 2 on the blade, more than four weeks continuous output results. Write today to learn of other application procedures. Dept. B-17.

FREE

MIR-O-COL
HARD-FACING RODS
ALLOY COMPANY
2416-60 EAST 53RD STREET, LOS ANGELES 11, CALIFORNIA

HANSON

Crawler

EXCAVATORS and CRANES

With Hanson Crawler Excavators and Cranes you can hoist, propel, swing and steer, all at the same time. This is the exclusive Hanson feature which enables so many engineers and contractors to add that extra bit of speed *and profit* that makes the job pay out.

Put this "extra profit" Hanson feature to work on your jobs.

EXCAVATORS

3/8 and 1/2 Cu. Yd. Capacity
Full revolving — Chain crowd —
Welded steel construction — Low center of gravity.
Gasoline or diesel.

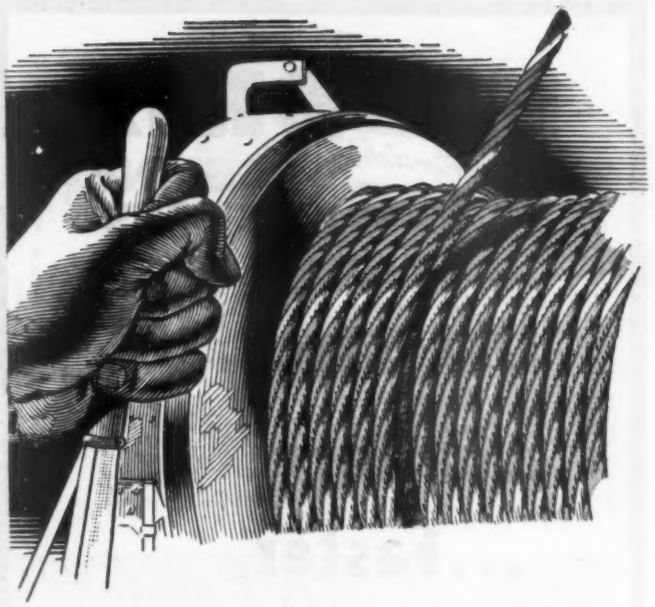
CRANES

4 and 6 Ton Capacity
Full revolving — Lattice type steel boom —
Balanced design — Low center of gravity —
Rugged — Versatile — Gasoline or diesel

CONVERTIBLE TO:
Shovel — Crane — Dragline — Pile Driver — Clamshell — Trench Hoe

Complete details in folder EC45. Write for it.

THE HANSON CLUTCH & MACHINERY CO.
TIFFIN, OHIO



Be Ready to Go

a lot sooner with *PREFORMED* YELLOW STRAND

Breaking in the new line is a shorter job when you rig up with flexible *Preformed* Yellow Strand. Internal stresses that stiffen unpreformed rope have largely been relaxed by preshaping wires and strands at the factory. After a gradual stepping up—to bed the strands firmly on the core—you can take the full load.

The same rope manageability promotes easier reeving through blocks and sheaves . . . even spooling on the drum . . . high resistance to kinking and whipping. All of these aid production and lower rope costs.

Specify *Preformed* Yellow Strand by name: for hoist and drag lines on your dragline machines . . . for holding and closing lines on clam shells . . . for hoist and swing lines, rack and crowd ropes on power shovels.

HAND BOOK FREE: "Industrial Wire Ropes" contains useful facts, tables, pictures. Write for your copy.

Broderick & Bascom Rope Co., St. Louis
Branches: New York, Chicago, Houston, Portland, Seattle
Factories: St. Louis, Seattle, Peoria

ARMY E NAVY

BRODERICK & BASCOM
Yellow Strand
***PREFORMED* WIRE ROPE**

HENDRIX
Lightweight DRAGLINE BUCKETS

DO THE JOB

...Easier

...Faster

...Cheaper

3/8 to 30 CUBIC YARDS

- ★ 20 to 40 per cent lighter than other buckets, type for type.
- ★ All welded construction for greater strength and durability.
- ★ Manganese Steel chains, fittings, and reversible tooth points.
- ★ Full Pay Load every trip, even in wet diggings.
- ★ Perfect Balance; handles easier, fills faster, dumps quicker.
- ★ Three Types—light, medium, and heavy duty.

WRITE OR ASK YOUR DEALER FOR DESCRIPTIVE LITERATURE

DESOTO FOUNDRY, INC. • MANSFIELD, LA.

NEW LEADER Truck Body Type

LIME SPREADERS

Can Now Be Purchased Without Triple AAA Certificates or Priority

THE above picture shows a rear view of the new model NEW LEADER marl and lime spreader. This spreader is equipped with an extra wide conveyor and two distributor discs and is strictly a one-man spreader. You will be able to haul wet lime or marl and, due to the large opening in the back end of the spreader, material will always feed onto the distributor disc evenly.

This spreader has many outstanding features. Both gear boxes driving the distributor discs are equipped with cut steel gears and ball-bearings running in a dust-proof and oil-tight gear case. The large gear box driving the wide chain conveyor is equipped with a steel ring gear and pinion and a thrust bearing also running in a dust-proof and oil-tight gear case. Bearing hangers are placed underneath the distributor discs; these are also equipped with ball bearings. This helps to carry the weight of the distributor discs and the load, the weight not being suspended from the gears in the small gear box. With this arrangement you are assured longer lived gears. The framework of the spreader is of hardwood.

These spreaders can now be purchased without priority or certificates of any kind. Write us for any additional information, also prices.

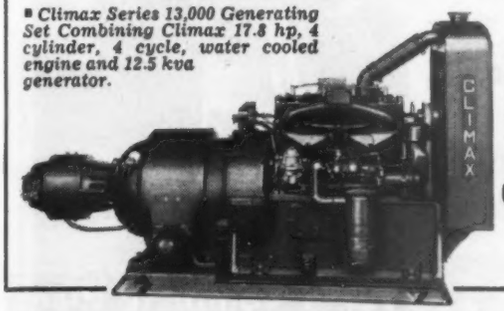
HIGHWAY EQUIPMENT COMPANY, INC.

Manufacturers of the World's Most Complete Line of Spreaders, Including Lime Spreaders, Sand and Cinder Spreaders, Chip Rock, Clay and Dirt Spreaders.

CEDAR RAPIDS, IOWA, U. S. A. Phone 32017-32018

Unfailing . . . Low Cost POWER and LIGHT

in 5 to 12.5 kva range, AC or DC



Climax Series 13,000 Generating Set Combining Climax 17.8 hp, 4 cylinder, 4 cycle, water cooled engine and 12.5 kva generator.

CLIMAX SERIES 13,000 Generating Sets

THE DEPENDABLE, smooth, power output and steady, flickerless lighting supplied by these compact, quiet-running units makes them invaluable for railroad, construction and oil field flood lighting — for standby power and light in industrial plants, hospitals, schools, etc.— and for operating medium size radio transmitters and electric magnets.

21 Models, 5 to 12.5 kva AC, and 6 to 10 kw DC, available with hand crank, remote control or automatic emergency transfer starting. Equipped for stationary or portable service. Operates on gasoline, natural gas, butane or other fuels.

Average fuel consumption at full load, .20 gals. per kwh—on 1000 BTU natural gas, 25 cu. ft. per kwh.

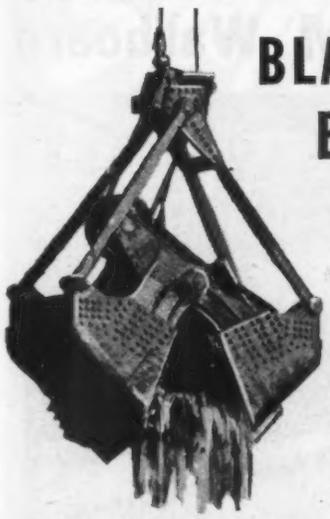
For bulletin describing all available models, write Climax Engineering Company, Clinton, Iowa. Other Climax Generating Sets from 300 watts to 312 kva.

climax GENERATING SETS
Builder of Climax BLUE STREAK and DIESEL ENGINES
CLIMAX ENGINEERING COMPANY

YOU ALWAYS GET

PEAK PERFORMANCE FROM

BLAW-KNOX BUCKETS



Every Blaw-Knox bucket is designed for a specific purpose—the greatest output from your crane.

★

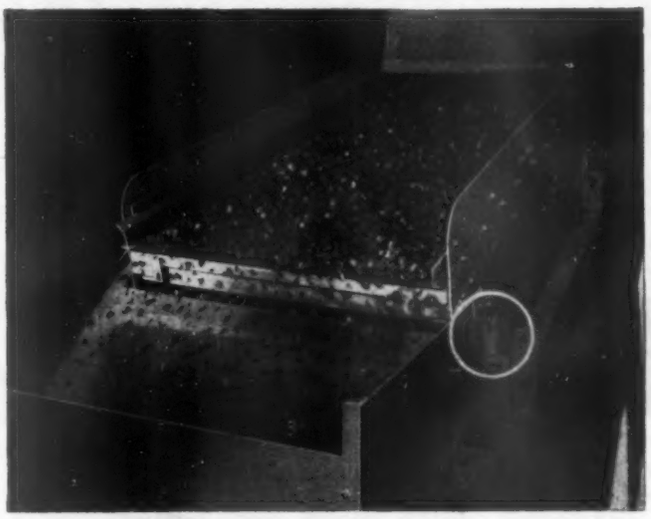
BLAW-KNOX BUCKETS in over 100 types and sizes are illustrated and described in Catalog 1757 . . . send for your copy today.

BLAW-KNOX DIVISION
of Blaw-Knox Company
2004 FARMERS BANK BLDG.
Pittsburgh, Pa.
New York • Chicago • Philadelphia
Birmingham • Washington
Representatives in Principal Cities

MAKE 'EM LAST

Bulletin 2004 gives complete instruction on the Care and Maintenance of Clamshell Buckets . . . copy on request.

Here's a Case Where GOING AROUND IN CIRCLES *Pays Off*



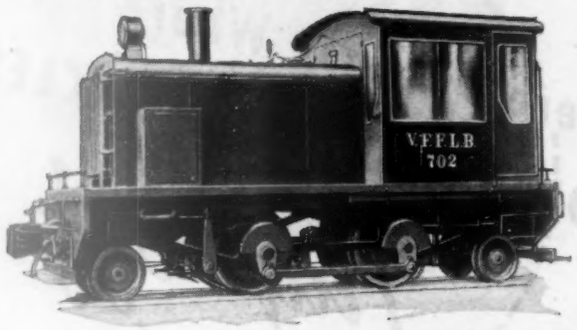
SECO Screens More Tons Per Hour Wet or Dry Materials

Advanced engineering — in the form of Seco's patented equalizer assembly. This is the thing that makes possible Seco's true circular motion. This is the thing, too, that gives every inch of the screen maximum screening effectiveness—no matter how the load is put on it. Operators everywhere—who have put Seco vibrating screens to the test on all types of screenings report not only increased tonnages but also long, dependable service with a minimum of upkeep. There is a *right* Seco vibrating screen for your job. Write Dept. A today for free catalog.

SECO SCREEN EQUIPMENT CO., INC.
9 Lafayette Avenue, Buffalo 13, N. Y.

INDIVIDUALIZED HAULAGE UNITS

STEAM—GASOLINE—DIESEL LOCOMOTIVES—ELECTRIC OR MECHANICAL DRIVE



Leading and trailing trucks permit adequate speeds with SAFETY where track is uneven.

Versatile Davenport Better-Built Locomotives are available in a wide range of types and sizes INDIVIDUALIZED to particular requirements. For BEST results in long service and LOWEST TON-MILE COSTS your locomotive should FIT your operating conditions.

Davenport engineers will be glad to analyze your haulage conditions and recommend the best type of unit for economy and extra years of general satisfaction.

Complete Information on Request

EXPORT OFFICE **BROWN & SITES** 50 Church St., New York Cable Add. "BROSITES"

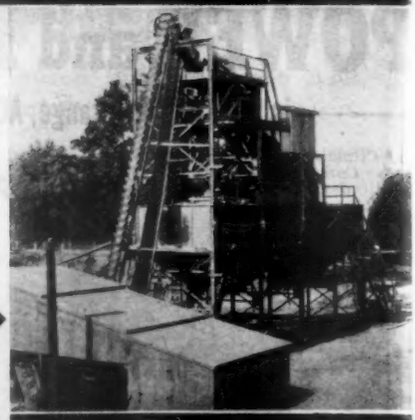
STEAM—GASOLINE—DIESEL LOCOMOTIVES—ELECTRIC OR MECHANICAL DRIVE

DAVENPORT LOCOMOTIVE WORKS
A DIVISION OF DAVENPORT BESLER CORPORATION, DAVENPORT, IOWA

Consult COLUMBUS

Preferred by Producers of CONCRETE CEMENT SAND GRAVEL CRUSHED STONE

Modern sand washing plant, equipped throughout by COLUMBUS.



For a Complete Plant or a Bucket

COLUMBUS *dependable* machines are widely recommended for operating efficiency and economy by leading producers of non-metallic minerals.

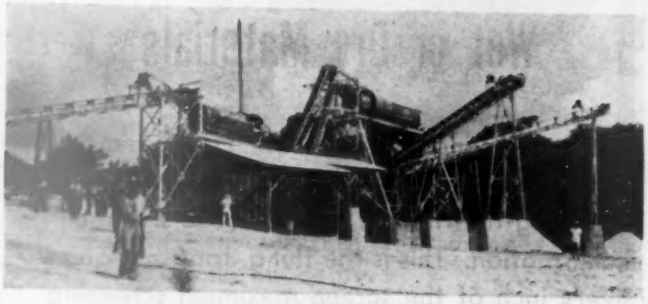
The services of experienced COLUMBUS engineers are available at all times without obligation.

Write for Catalog 55

THE COLUMBUS CONVEYOR COMPANY
Columbus 8, Ohio

Some territory open for responsible representatives.

Don't Experiment in a Quarry!



This job takes RELIANCE EQUIPMENT

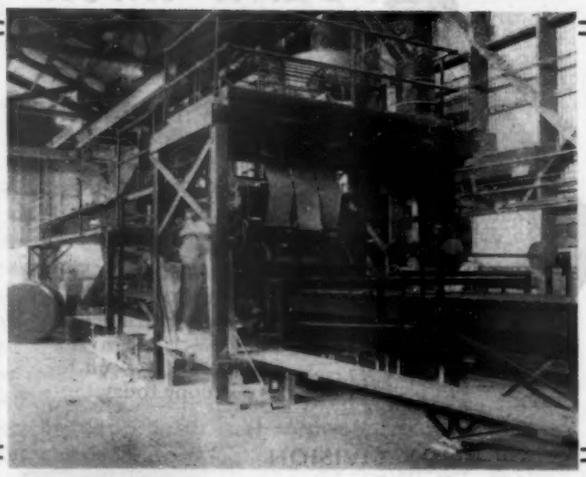
Rely on RELIANCE for Rock Crushers, Bucket Elevators, Revolving Screens, Wash Boxes, Feeders, Belt Conveyors, Air Separators, Hoists, Drag Lines, and other material handling equipment.

Write for Bulletin

Large-scale, profitable crushed rock production requires the right *tools* throughout — n o t h i n g "almost as good" will do!
That's why a fast-growing list of successful installations — l i k e the above — are RELIANCE-Equipped "from top to toe!"

UNIVERSAL ROAD MACHINERY CO.
KINGSTON, NEW YORK
Distributors in all principal cities of the U. S. A.

EHRSAM Equipment
Preferred for Producing
GYPSUM Wallboard

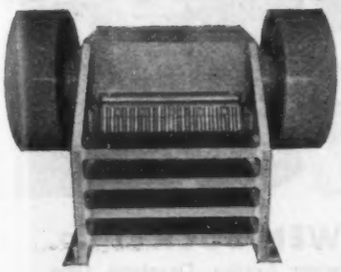


EHRSAM BOARD MACHINE
Forming and Palette Section

EHRSAM furnishes a complete line of specialized equipment for making gypsum wall board and plaster lath.
EHRSAM modern design machines provide for all phases of material handling and processing operations. Write for engineering information.

THE J. B. EHRSAM & SONS MFG. COMPANY
ENTERPRISE, KANSAS

The "ROCKBUSTER" crushes 1500 Tons per Day!



• • • It's an EAGLE Jaw Crusher, of course, the mainstay of modern crushed stone plants.

This *sustained* record output of uniformly sized material is a proof of the built-in power and strength of EAGLE machines, insuring long service life and maximum operating economy.

Territory open for responsible distributors

EAGLE

JAW CRUSHERS
IMPACT BREAKERS
PULVERIZERS
CONVEYORS
LOADERS

Write for Bulletins

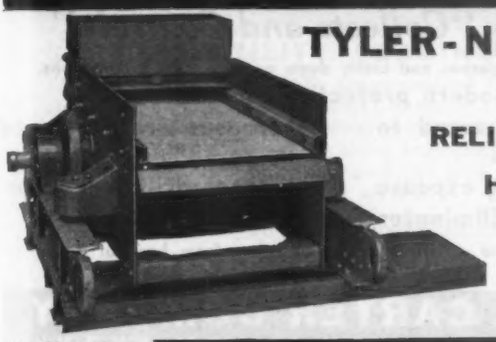
EAGLE CRUSHER CO., INC., Galion, Ohio

From the SMALLEST to the LARGEST TONNAGES

TYLER-NIAGARA SCREENS

are

RELIABLE
HIGH CAPACITY
EFFICIENT
ECONOMICAL



2' x 4' Type 100 Tyler-Niagara Screen

6' x 14' Type 900 Tyler-Niagara Screen

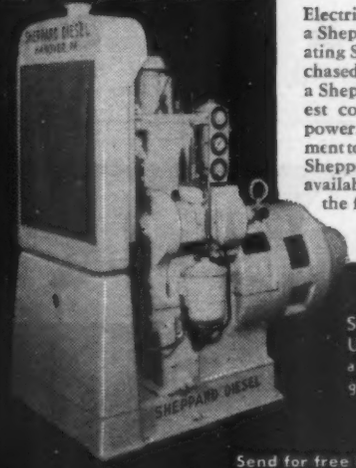
THE W. S. TYLER COMPANY, Cleveland 14, Ohio

Sheppard

ALL-AMERICAN
DIESEL

Let your POWER SAVINGS Pay for your Power Source

Electricity generated with a Sheppard Diesel Generating Set is electricity purchased at a saving . . . for a Sheppard converts lowest cost fuel into ready power. It's sound management to lower power costs. Sheppard Diesels are now available—write today for the facts.



Sheppard Model 7 Power Unit direct-connected to a 5 kw single bearing generator with exciter.

Send for free literature on Sheppard

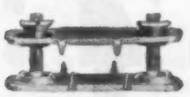
POWER UNITS • GENERATING SETS • PUMPING UNITS

R. H. SHEPPARD COMPANY
1413 Middle Street, Hanover, Pennsylvania

Keep your conveyor belts going with FLEXCO HD BELT FASTENERS

• **FLEXCO H D RIP PLATES** are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.

• Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.



• **FLEXCO H D BELT FASTENERS** make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

Write for your copy

FLEXIBLE STEEL LACING COMPANY
4623 Lexington St., Chicago 44

FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

TOUGH GOING

but

OWEN BUCKETS

Finish the JOB

A MOUTHFUL AT EVERY BITE

The OWEN BUCKET Co.

6050 Breakwater Avenue, Cleveland, Ohio

Branches: New York Philadelphia Chicago Berkeley, Cal.

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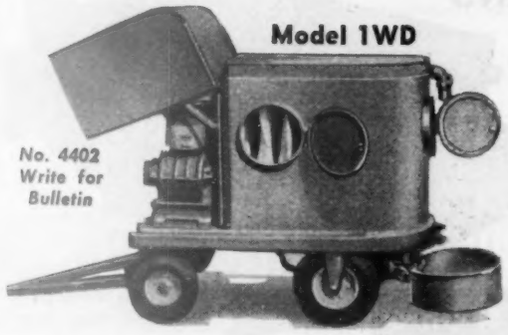
25 to 33 PERCENT FASTER DRILLING

MARKLEY-CARTER

PORTABLE DUST COLLECTOR

"Collects and Controls"



Model 1WD

No. 4402 Write for Bulletin

It's defeat day for dangerous and costly dusts on your rock drilling jobs.

This modern protective method

- Reduces silicosis hazard to safe hygienic limits
- Increases drilling speed up to 33%
- Reduces sharpening expense
- Reduces drillsteel wear
- Eliminates wet drilling

Keeps plant, motors, and machinery clean and free from harmful dusts.

RALPH B. CARTER COMPANY

192 ATLANTIC ST., HACKENSACK, N. J. 53 PARK PL., N. Y. 7, N. Y.

SCREEN SERVICE!

RUGGED, DURABLE AND ACCURATE

ALL METALS ALL WEAVES

FOR ANY INDUSTRIAL APPLICATION

THE CLEVELAND WIRE CLOTH & MFG. CO.

3574 E. 78TH STREET CLEVELAND, OHIO

DAYBROOK

HYDRAULIC HOISTS –

STEEL DUMP BODIES

All Sizes — Any Capacity

THE DAYBROOK HYDRAULIC CORP.

BOWLING GREEN, OHIO

It Scoops
It Hoists
It Loads

That's the
TRUK-LODER
for quick jobs

Fast as 15 or 20 shovelers Fills truck in 2 or 3 minutes
Fits on any type of truck

GENERAL UTILITY LOADING DEVICE

TRUK-LODER is especially recommended for contractors and communities. It's the working equal of a large and costly shovel in loading gravel, crushed stone, etc. For those requiring a shovel for short intervals, it can be detached quickly by removing two hinge pins and the truck put back into regular hauling service.

Territory open for responsible distributors

Write for Information

TRUK-LODER COMPANY
55 Grace St., TIFFIN, OHIO

KEEP PRODUCTION UP
WITH LINK-BELT VIBRATING SCREENS

Made in a number of standard sizes — single or multiple decks, with or without enclosures.

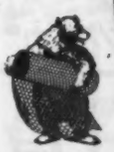
You can depend on Link-Belt screens to do just that kind of a job. In their design, we give you the benefit of our wide experience in solving all kinds of screening applications. Made in a number of standard sizes. Get Link-Belt Screens and keep production up!

10,080

LINK-BELT COMPANY, Philadelphia 40, Chicago 9, Atlanta, Indianapolis 6, Pittsburgh 19, Cleveland 13, New York 7, San Francisco 24, St. Louis 1, Toronto 8. Other Offices in Principal Cities.

IF IT'S WOVEN WIRE
We Have It!

It makes little difference what your requirements are, if it is woven wire we either have your particular specification in stock or can weave it for you on short order. We weave wires finer than a human hair, up to rods ½" in diameter, of any available metal that can be woven. That covers a lot of territory, so, whenever you need woven wire, inquire of CALWICO first. The California Wire Cloth Corporation, 1001 - 22nd Avenue, Oakland, California.



CALWICO

FREE!

TRY IT AT OUR EXPENSE

Amazing New Cast Iron Electrode—
P&H "HARCAST"

You have waited for "Harcast" — the newest, most important development in cast iron welding. Now it's here — after three years of exhaustive research — to bring you faster, easier, better welds.

Use "Harcast" once and you'll use it always. That's why we offer a generous test sample — yours for the asking! See for yourself why P&H "Harcast" is sweeping the welding world . . . the greatest cast iron electrode ever offered. Write *now* for your test sample.

- √ For AC or DC Welding
- √ Tensile strength twice that of good grade cast iron
- √ Fuses well with mild or medium carbon steels
- √ Ends worries of excess porosity, cracking, pulling away
- √ For single or multiple pass welding
- √ Is semi-machinable
- √ For low amperage welding

"Harcast" is a development of P&H — makers of the famous line of P&H Arc Welders, Welding Electrodes, Welding Positioners and Electric Hoists.

General Offices: 4451 West National Avenue, Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION
WELDING ELECTRODES · MOTORS · HOISTS · P&H · ELECTRIC CRANES · ARC WELDERS · EXCAVATORS

Correct and Dependable Brake Lining and Frictions for Every Make, Model and Duty

Raybestos Division of Raybestos-Manhattan, Inc.
Bridgeport, Conn.

Raybestos

INDUSTRIAL FRICTION MATERIALS

For Shovels, Cranes, Hoists, Tractors and Earth Movers

DENVER HYDRO-CLASSIFIER

The Denver Hydroclassifier is designed for fine sizing and de-sliming problems where it is essential to reduce materials to sizes minus 200 mesh to 10 microns. Enclosed integral lift vertical worm gear drive makes it easy to raise rakes. The spiral rakes convey material to center cone in one revolution. Ask us how these machines will save you money. Write for new bulletin No. C4A-B.

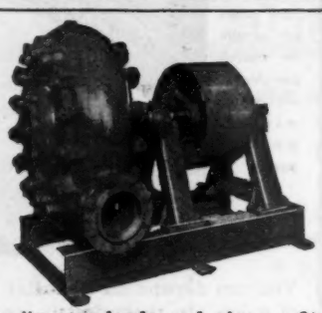
Denver Equipment Co.
1400 Seventeenth Street
Denver, Colorado
New York, N. Y., 50 Church St.
Salt Lake, Utah, McIntyre Bldg.
Chicago, Ill., 1005, 69 W. Wash.
Toronto, Ont., 45 Richmond St.
exico,D. F., Republica Mexico

The Lightning

Sand and Gravel Pumps

HEAVY-DUTY
(Ball-Bearing)
and Low Head Types

Complete stock of replacement parts, elbows and fittings carried for prompt shipment.



Replacement parts made to jig standards and always fit and always available.
For 30 years LIGHTNING pumps have faithfully performed the work they are intended for. We manufacture a type and size to fit the need. Simplicity of design and ease of handling have made these pumps one of the most popular. Write for catalog now.

Mfg. by
KANSAS CITY HAY PRESS CO., KANSAS CITY, MO.

Since **1835** **HEADQUARTERS**

for Dependable

PIT, MINE and QUARRY EQUIPMENT

McLANAHAN and STONE CORPORATION
HOLLIDAYSBURG, PENNA.

T. C.

Woven Wire
SCREENS

Half-Century of Dependability

For
ACCURACY
ENDURANCE
ECONOMY

SQUARE OPENING
OBLONG OPENING

Standard and Special Weaves

TWIN CITY IRON & WIRE CO., St. Paul, Minnesota

DIAMOND CORE DRILLING

CONTRACTORS

Fire Clays, Coal, Limestone
Gravel Deposits, All Minerals

MOTT
CORE DRILLING CO.
HUNTINGTON, W. VA.

GEARS

Philadelphia Gears are made in all types and sizes for every industrial need.

MOTOREDUCER

Motor and speed reducer in one sturdy housing. Both horizontal and vertical types with ratios up to 450:1. All standard horsepowers. A. C. or D. C. motors.

Also Racks, Ratchets, Pawls, Couplings, Electric Hoists, LimiTorque Valve Operators.

SPEED REDUCERS

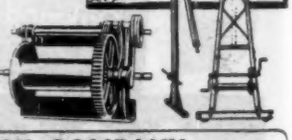
We have a complete line of speed reducers of all types in a wide range of ratios and horsepowers for straight line, right angle or vertical drives.

PHILADELPHIA GEAR WORKS, Inc.
Erie Ave. and G St. Philadelphia 34, Pa.

Hoists • Derricks Winches

A Complete Line of Contractors' Derricks and Winches—Nationally Known for dependable service and long life.

Write for Catalog or send your problems to our Engineering Department.
The Sasgen line is handled by leading equipment distributors everywhere.



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STEELGRIP Standard Rigid Arm Gear and Wheel Pullers are of improved design. Will not slip from work. Arms are forged and heat treated. 2-arm, 3-arm and special designs. 34 types and sizes.

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Building programs are beginning to move fast. Are you ready?

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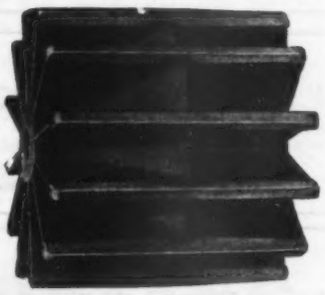

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Familiar with pipe, block or any special concrete product. Must have at least high school education, be mechanically inclined and have pleasing personality. Age limit 48. Postwar opportunity with large concern branching out into full line of products in various sections of the United States and operating on an incentive profit sharing plan. Past record must stand rigid inspection. Include photograph in reply. Address Box 709, care of

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Vast deposit of HIGH GRADE ROCK and EXQUISITELY COLORED MARBLE, estimated at over 15,000,000 tons, strategically located in the heart of Florida. Can not be shut off by competition. Raw material suitable for manufacturing of concrete aggregates, road material, asphalt mixes, agricultural limestone, burned and chemical lime, rock wool, dry ice, bottled gas, dimension stone, non-slip floor tile, building stone, decorative, ornamental and monumental stone. Some samples tested by U. S. Bureau of Standards rate second to the best in the U. S. Operated since 1933 for production of concrete aggregate only. A great Post War opportunity with a chance of a life time is waiting here, the man or firm with capital to develop this huge and unusual deposit.

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Total 1600 HP required, with or without Generators. Consider units 225 HP and larger. Also smaller high speed units for standby service. Preference given units immediately available. Give complete details and price.

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1—Heavy Duty electric vibrating grizzly type feeder, 2 vibrator units size 5 Jeffrey Traylor, or equal.

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2-yd. PAGE 411 DIESEL DRAGLINE
½-yd. Type "C" INSLEY SHOVEL—$1800
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Splendid opportunity for experienced Cement Engineer. Knowledge of plant design and erection required.

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Wanted to buy small up-to-date block making equipment including the steel pallets.

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Engineer with experience designing stationary and portable gravel and quarry plants by mid-west manufacturer. Give detailed account of experience and salary expected.

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We look into the earth
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SALES ENGINEER WANTED

Salesman with concrete and highway work experience wanted in northern Illinois to assume charge, in due course, of sand and gravel sales and development. Engineering experience desirable. Automobile furnished. Excellent future. Prefer man not over thirty-five. Attractive compensation. State experience—salary in mind.

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WANTED JOY LOADER 2-TON BATTERY LOCOMOTIVE

STANDARD CLAY PRODUCTS COMPANY
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WANTED

Experienced hard rock quarry superintendent to operate modern well-equipped plant in Middle West. Attractive proposition for right party.

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Five Ton Industrial low lift Truck gasoline or storage battery 108" table.

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Construction Plant and Equipment From Shasta Dam, California

Available For Sale **Immediate Delivery**

CABLEWAYS AND HOISTS

3—Lidgerwood, 3-drum electric hoists with 500 H.P. G.E. Motors. Ward Leonard control, complete with controls and all electric equipment.

2—Lidgerwood, 3-drum electric hoists with 500 H.P. Westinghouse motors complete with controls and all electrical apparatus.

5—Cableway towers, structural steel, 3—125 ft.; 1—75 ft. and 1—45 ft., complete with travel mechanism.

6—Complete sets of carriages, main and auxiliary, fall and dump blocks, fall rope carriers, buttons, takeup bars and takeup sheaves.

1—American pillar crane. Cap. 5 T. at 48½ ft. and 15 T. at 25 ft. radius.

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12,000 lin. ft. of used 3" dia. locked coil cable in length from 500 to 2600 lin. ft.

Misc. lot of sheaves, jewels, blocks, etc.

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1—Dual #265 Fuller Fluxo cement pump, duplex type complete with gravity feed and automatic control equipment. 400 bbls. per hr. capacity. Pumping distance 3300 ft.

2—Fuller-Kinyon Pumps — type "D" 125 h.p. complete with air hose power control cable, control cabinets.

1—C-200 Fuller single stage rotary compressor Westinghouse motor 100 h.p.

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50—Motor operated gates, for sand and gravel up to 6" cobbles with 1 h.p. Allis-Chalmers gear motor.

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1—Airplane tripper for 36" belt with two 17' wing belts, capacity 1,000 T per hour, complete with pulleys, drives and gear motors.

16—White Dump Trucks Model 1580-691, 24 cu. yd. capacity in good condition.

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2—Mod. 315 I-R portable compressors, gas driven.

5—I-R paving breakers.

8—I-R drifters DA35.

2—I-R Wagondrills—pneu. tires, hoists, X71 drifters mounted.

1—I-R-54 Drill Sharpener.

10—I-R Jackhammers.

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10—8 cu. yd. steel hoppers including gates and air rams.

2—Water filters—style RW78 Infilco.

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1—9500 bbl. all welded water tank, 48' dia., 30' high.

1—5400 bbl. all welded water tank, 36' dia., 30' high.

1—200 bbl. steel water tank.

10—Sandblast tanks 24" x 96" with hoppers and fittings.

10—Lubricator tanks 14" x 30"; 24" x 48"; and 24" x 60".

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3—Bingham type SVD submersible pumps.

1—Byron-Jackson 150 h.p. 10 in. deep-well.

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Other pumps complete with motors from 1½ h.p. to 200 h.p., also several I-R #25 sump pumps.

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1—Complete set C. S. Johnson fully automatic batching equipment for 5 aggregates, cement and water for 4 cy. batchers.

4—4 cy. Koehring Concentric zone mixers, incl. batchmeters, timers, consistency meters.

1—100-ton steel bin.

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1—G-D single drum air hoist.

1—PAX Automatic Telephone Switchboard with 76 phones.

Valves—1, 2, 3, 4, 6, 8, 10, 12, 16-inch.

Pole line hardware.

Floodlites—500 to 1500 w.

1—1¼ cu. yd. Heavy Duty Clamshell bucket.

12—Muck Skips, 7—14 cu. yds.

50—Chicago Pneumatic concrete vibrators, Nos. 417, 518 and 519.

Several sizes of monkey wrenches, wood borers, chipping and riveting guns.

1—Oxweld Acetylene Generator No. 311 B10.

1—Bearcat Model CO Tilting Top Saw Table with 10 h.p. motor.

1—P&H Smootharc 300 amp. gas-driven welder, mounted on John Deere Trailer.

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1—125 KW. motor generator set, 275 volts DC.

5—Blowers; American and Buffalo.

New and used rubber hose, including sandblast hose, ¾" to 4".

Complete stock of Warehouse supplies.

Complete line of transformers and electric motors.

ALL ITEMS SUBJECT TO PRIOR SALE

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SENSATIONAL OFFER to AID QUICK CONSTRUCTION

To-day the ECONOMY COMPANY, prominent distributor of used Construction Machinery, announces that it offers a large list of construction equipment, situated throughout the United States, on a "Pay-as-you-go" basis, with the privilege of ownership. Among leaders in the Construction Industry here the plan is regarded as giving an added impetus to early bidding and speedy letting of heavy construction jobs.

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An exceptionally good selection of shovels, cranes and draglines. We would suggest you write or phone at once for complete information regarding any of the following units —

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¾ yd Bucyrus 10B
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¾ yd Hanson
¾ yd Insley
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¾ yd Lorain 27
¾ yd Universal
¾ yd Unit

½ YARD

½ yd Bay City Model K
½ yd Bay City 30
½ yd Bucyrus 10/20
½ yd Byers Bearcat
½ yd Byers 128
½ yd General
½ yd Hanson
½ yd Insley
½ yd Speeder B3
½ yd Link-Belt Speeder
½ yd Lorain 30
½ yd Mead-Morrison
½ yd Northwest 2
½ yd P&H 200
½ yd P&H 150

⅝ yd P&H 300A
⅝ yd Unit
½ yd Universal

¾ YARD

¾ yd American
¾ yd Austin
¾ yd Bay City 16B
¾ yd Brownhiost
¾ yd Bucyrus 20B
¾ yd Bucyrus diesel D2
¾ yd Bucyrus 10/30
¾ yd Bucyrus GA
¾ yd Bucyrus 30B
¾ yd Byers
⅞ yd Byers Bulldog
¾ yd General
¾ yd Keystone
¾ yd Koehring 301
¾ yd Koehring 251
¾ yd Link-Belt
¾ yd Speed crane
¾ yd Lorain 40
¾ yd Lorain 45
¾ yd Marion Model 7
¾ yd Marion Model 120
¾ yd Mead-Morrison
¾ yd Northwest Model 3

¾ yd Northwest 105
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¾ yd P&H 400
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1 yd Browning K2
1 yd Bucyrus 30B
1 yd Bucyrus GA2
1 yd Bucyrus diesel 30B
1 yd Bucyrus-Erie GA2
1 yd Byers Model Master
1 yd Keystone
1 yd Koehring 401
1 yd Speederane
1 yd Link-Belt K1
1 yd Link-Belt K-32
1 yd Lorain 55
1 yd Lorain 60A
1 yd Marion 440
1 yd Marion 7
1 yd Northwest
1 yd Northwest 4
1 yd Northwest 105
1 yd Osgood
1 yd P&H 600

1¼ YARD

1¼ yd Bucyrus GA2
1¼ yd Bucyrus GA3
1¼ yd Byers Master
1¼ yd Koehring Model 1
1¼ yd Lima 101
1¼ yd Link-Belt K42
1¼ yd Lorain Model 75

1¼ yd Lorain 75A
1¼ yd Marion 450
1¼ yd Marion diesel 450
1¼ yd Northwest 5
1¼ yd Northwest 104
1¼ yd Osgood
1¼ yd P&H 600A
1¼ yd P&H 700
1¼ yd P&H 650

1½ YARD

1½ yd Bucyrus-Erie 37B
1½ yd Koehing diesel
1½ yd Koehring 601
1½ yd Lima
1½ yd Link-Belt K2
1½ yd Lorain 75B
1½ yd Lorain 77 diesel
1½ yd Marion
1½ yd Northwest 6
1½ yd Osgood diesel
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2½ yd Northwest Model 80
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4 yd Marion 4160
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15 yd Bucyrus
26 yd Marion

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⅜ yd Bucyrus B2
¾ yd McMyler
¾ yd Osgood
1 yd Browning
1 yd Byers
1¼ yd Bucyrus 30B
1¼ yd Osgood
1¼ yd Marion
1¼ yd Marion 36
1¼ yd Bucyrus 30B
1½ yd Austin
1½ yd Bucyrus 50B
1½ yd Marion 32
1½ yd Marion 37
1½ yd Osgood
1¾ yd Marion 37
2 yd Bucyrus 50B
2 yd Bucyrus 14
2½ yd Bucyrus 80B
2 yd Marion 36
2 yd Monighan
2 yd Osgood
2½ yd Osgood 70C
3 yd Marion
3½ yd Bucyrus-Erie 175B
3½ yd Bucyrus 95C
3½ yd Bucyrus Monighan
1½ yd Bucyrus Class 24
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Type 14-B Farrell Jaw Crusher
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Complete Gravel, Crushing, Screening and Washing Plant
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Large stock of new and used Ingersoll-Rand air compressor equipment.

CRUSHERS - ELEVATORS SCREENS - CONVEYORS

1—7½"x13" Champion Jaw Crusher.
2—9"x15" Champion Jaw Crusher
1—10"x20" Champion Jaw Crusher.
3—12"x26" Champion Jaw Crusher
1—12"x20" Buchanan Jaw Crusher.
1—4½" Traylor Gyratory Crusher.
1—No. 2F Telsmith Gyratory Crusher.
1—S-A-9" loop Redler Elevator.

JOHNSON & HOEHLER, INC.
Lansdowne, Penna.

FOR SALE

Besser Super Tamper, 4 years old, with automatic pallet feeder and 14 foot conveyor, complete with skip hoist, new 10 HP ball-bearing motor, and attachments for 4-6-8 and 12" block 16" long (8" attachment new) also bull-nose corner, sash and fractional attachments for all sizes; and 2100 steel pallets. Priced for immediate sale and delivery at $7500.00.

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SAND & GRAVEL PLANT

Plant located on 50 acre deposit is 10 miles north of Newark, N. J. Has 100 ton per hour capacity and is now in operation.

The following is a partial list of assets:

Main plant—2 large crushers, 2 sand drags, 1 cone tank and 3—40 ton steel storage bins.

Auxiliary equipment—2—1½ yd. shovel-crane combination Diesel machines. 1—300 ton steel sand bin. 1—100 ton steel gravel bin. 1—200 ton steel batching plant with Kron dial scale. Baldwin Diesel electric plant supplies electricity for complete operation.

Office, including 25 ton scale. Price $100,000.

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1—20-ton WHITCOMB 36" Ga. Diesel Locomotive—rebuilt.

1—78-ton BALDWIN Type 0-6-0 Standard Ga. Side Tank Locomotive—new 1923—rebuilt.

1—80-ton BALDWIN Type 0-6-0 Standard Ga. with separate tender —rebuilt.

1—20-yd. WESTERN Air Dump Car, Vertical Cylinders, reconditioned.

1—20-ton BROWNHOIST 8 wheel Loco. Crane—1921 50' boom—DD—Excellent condition.

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Girard Trust Company Building
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SHASTA DAM SAND AND GRAVEL PLANT EQUIPMENT

Including—GOODYEAR 9-MILE-HAUL 36" SPECIAL CONVEYOR BELTING, 32,000' of Belt remaining, with Idlers, Pulleys, and drives.

ALSO—

Electric Motors, Line Equipment, Transformers, and Supplies; Pendulum Boom Belt Conveyors, 100' and 200'; Merrick Feedoweights and Weightometers; Dorr Hydroseparator, 20'x4'; Marcy Rod Mill, 8'x12'; Vibrating Screens; Dorr Rake and Bowl Classifiers; Extra-heavy Gravel Washer, Trommel type; Pumps: Centrifugal, Deep-well, Steam, Dredge. Auxiliary Equipment: Chain Hoists, Winches, Welding Machines, etc.

Subect to Prior Sale

Write, Wire, Telephone Redding 1440

COLUMBIA CONSTRUCTION COMPANY, INC.
Box 579 Redding, California

FOR SALE

Allis-Chalmers 5' x 10' Rod Mill, closed end type; gear and pulley drive; Manganese liners.

Allis-Chalmers Double Roll Crushers, Type XX, Size 54" x 24", with new tire steel shells.

Austin Gyratory Crusher No. 107.

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Three George vibrating concrete block machines specially built to manufacture (four at a time) 4x8x12 or 5x8x12 or any fraction thereof. These machines are of special value in locations where this size predominates such as in California, New Mexico and Florida. Two machines practically new and one machine still crated.

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1—Holder-on, Ingersoll-Rand, Ser. 10739, Size 2
5—Hammer, rivet, Chicago Pneumatic, Model 90, Size 1¼"
2—Hammer, rivet, Chicago Pneumatic, Model 80X, Size 1⅜"
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Diesel Engine

1—14x17 four cylinder Fairbanks-Morse Diesel Engine with 170 KW 2300 Volts 60 Cycle 3 phase generator. Price $2600.

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6 cylinder, 514 RPM, Clutch
Heavy Steel Skid Mounted
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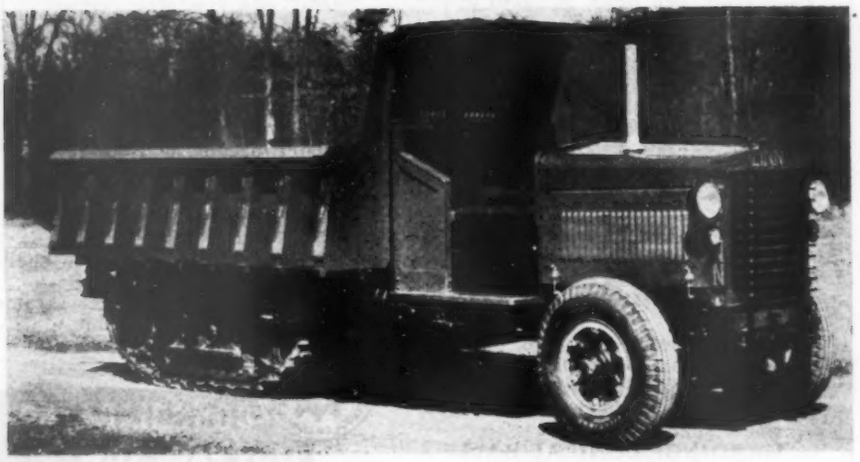

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One 9-K Gates Allis Chalmers Crusher No. 5554, Complete with Allis Chalmers TexRope Drive.
A. C. Motor 200 HP, 900 RPM, 3 Phase, 60 Cycle, 440 Volt.
11 E-330 TexRopes 1½" x 1" x 330" Pitch Length.
Necessary Starting Equipment.

One 11 Groove Sheave 21.6" Dia. Motor Sheave

One 11 Groove Sheave 52" Dia. Face 19¾"

Special Crusher Parts.
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Two 10" Newhouse (Allis Chalmers) Crushers, Serial Nos. 8477 and No. 8520, Complete with 150 H.P. 3 Phase, 60 Cycle, 220 Volt, 575 RPM Allis Chalmers Motors.
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Two Main Shaft Nuts
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AVAILABLE WITHOUT PRIORITY

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1—3′ Symons with coarse bowl
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2—Komarek-Greaves 32″ dia. x 24″ face, rated 25 t.p.h. with extra shafts and rolls.

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3—5′x40′, 5′x48′, 6′x50′, all made by Vulcan Iron Works. Equipped with firing hoods, complete.
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2—4′x6x16″ and 6′x22″, iron lined.
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2—Dorr Combination Bowl & Rake Classifiers, 10′ dia. with 2′3″x19′8″ rake and 12′ dia. with 2′3″x21′4″ rake.

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1—30″x24′ long, heavy steel frame, semi-portable.
1—30″x120′ c/c, Rex-Stearns anti-friction idlers; steel frame.
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1—80 ton Baldwin 0-6-0 separate tender switcher, built 1925, A.S.M.E. boiler, piston valves, Walschaertes valve gear, overhauled and up to date on all I.C.C. requirements.
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20 ton O. H. Crane, 39′6″ span.
22½ ton No. 8 Browning steam loco. crane.
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92 & 100 Marion steam shovels on cats.
18 & 20 ton steam saddle tank locom.; 36″.
16 ton Vulcan Gas Loco.; 36″ ga.
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1—1400 Ft. Sullivan, Belted
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36x60 Fairmont Single Roll.
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10x8, 13x7½, 14x7, 15x9, 15x10, 16x9, 16x12, 16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 20x11, 26x12, 30x15, 30x13, 36x30, 36x18, 36x14, 36x15, 36x9, 36x6, 38x18, 36x10, 36x24, 42x9, 48x36, 60x42, 84x66, 36x16, 9x36.
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7—750 & 1000 Gal. Distributor Trucks.
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5 Roll High Side.

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1—8 ton VULCAN Standard gauge gasoline locomotive.
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1—10 ton Buffalo Springfield gas roller with scarifier.
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Single, double & triple drum hoists.

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2—50 ton American-Terry All Steel Stiff Leg Derrick for barge mounting, 65 ft. boom can be used for stationary work. Also heavy duty blocks.

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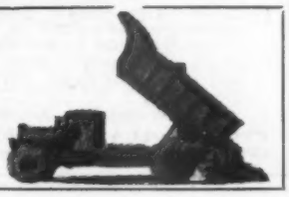

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150	Wtg.	CW	2200	600
100	Westg.	vert.	2200	1160
100	G. E.	IM	2200	1800
100	Westg.	HF	440	230
75	Northw.	HW	220	1740
50	G. E.	MT	2200	1200
50	G. E.	MT	220	900
50	Westg.	HF	440	860
50	Al. Ch.	ARY	220	690
50	G. E.	MT	2200	600
40	Wagner	TBR	440	1725
40	Al. Ch.	ARY	220	1160
35	F. Morse	vert.	220	1800
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36"	6	1/8"	1/16"
30"	6	1/8"	1/16"
30"	5	1/8"	1/16"
24"	5	1/8"	1/32"
24"	4	1/8"	1/32"
20"	5	1/8"	1/32"
20"	4	1/8"	1/32"
18"	4	1/8"	1/32"
16"	4	1/8"	1/32"
14"	4	1/16"	1/32"
12"	4	1/16"	1/32"

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14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

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Index to Advertisers

Acme Road Machy. Co.....179
*Allis-Chalmers Mfg. Co.....32, 33
Alloy Steel & Metals Co.....116
*American Air Filter Co., Inc... 56
*American Cable Div. American Chain & Cable Co., Inc.....Inside Back Cover
*American Chain & Cable Co., Inc. .....Inside Back Cover
American Cyanamid & Chemical Corp. 133
*American Pulverizer Co.....123
Anchor Concrete Machy. Co.....140
Armstrong-Bray & Co.....173
Associated Equipment Distributors 108
Associated Metals 179
Atlas Powder Co.....14
*Austin-Western Co. 37

*Babcock & Wilcox..... 64
*Barber-Greene Co. 149
Barrett-Cravens Co. 145
Baughman Mfg. Co.....161
*Bemis Bro. Bag Co..... 28
Berg Vault Co.....145
*Bethlehem Steel Co..... 38
Big Rock Stone & Material Co..179
Birmingham Rail & Locomotive Co. 180
*Blaw-Knox Co. 167
Boston Woven Hose & Rubber Co. 17
Brew, Woltman & Co.....180
Brill Equipment Co.....181
Broadcast Section 174-187
Broderick & Bascom Rope Co...165
*Brooks Equipment & Mfg. Co....120
Brown-Strauss Corp. 186
Buckeye Traction Ditcher Co....151
*Buda Co. 53
Burnham, Royal E.....174
*Butler Bin Co.....142

California Wire Cloth Corp.....171
Carlyle Rubber Co., Inc....162, 187
Carter Co., Ralph B.....170
Caterpillar Tractor Co..... 25
Chicago Electric Co.....186
Chicago Perforating Co.....125
*Chicago Pneumatic Tool Co.....173
*Chicago Steel Foundry Co..... 121
Cleveland Rock Drill, Division of the Cleveland Pneumatic Tool Co. 26
Cleveland Wire Cloth & Mfg. Co.170
Climax Engineering Co.....167
*Colorado Iron Works Co..... 52
*Columbus Conveyor Co.....168
Commercial Shearing & Stamping Co. 140
Conserco, Inc. 34
Consolidated Products Co., Inc...180
Davenport Locomotive Works....168
Daybrook Hydraulic Corp.....170
Dempster Brothers 160
*Denver Equipment Co.....172
DeSoto Foundry, Inc.....166
Dewey & Almy Chemical Co.....113
*Diamond Iron Works, Inc..... 22
*Dixie Machinery Mfg. Co.....110
*Dorr Company 128

*Eagle Crusher Co., Inc.....169
*Eagle Iron Works.....114
*Easton Car & Construction Co... 1
Economy Company, Inc.176, 177, 183
*Ehrsam & Sons Mfg. Co., The J. B. 168
Eighmy Equip. Co.....185
Elastic Stop Nut Corporation of America 2
*Ensign-Bickford Co., The..... 36
Equipment Corporation of America 181, 183
Erickson Special Equipment Mfg. Co. 147
*Erie Steel Construction Co.....144
*Euclid Road Machy. Co..... 8

Farrel-Bacon 126
Farrel-Birmingham Co., Inc..... 41
Fawick Airflex Co..... 55
Fiske Brothers Refining Co.....122
Flexible Steel Lacing Co.....169
Ford Motor Co..... 15
Frog, Switch & Mfg. Co.....125
*Fuller Co. 150

Gardner Denver Co..... ... 48
Gar Wood Industries, Inc..... 23
Garrett Co., Inc., George K..... 27
Gates Rubber Co.....155
General Compressor & Tool Co...178
*General Electric Co..... 45
Gilson Screen Co.....124
Goodyear Tire & Rubber Co..... 3
*Gruendler Crusher & Pulverizer Co. 117

Haiss Mfg. Co., Inc., Geo..... 49
*Hanson Clutch & Machinery Co..165
*Hardinge Co., Inc.....106
Harnischfeger Corporation 171
Heidenreich, Jr., E. Lee.....174
*Hendrick Mfg. Co.....173
Hendy Iron Works, Joshua..... 39
Hercules Powder Co..... 35
Hercules Steel Products Co.....105
*Hetherinton & Berner, Inc.....112
Hewitt Rubber Corp..... 29
Highway Equipment Co.....166
Honan Crane Corp.....164
Huelsmann Quarry Co.....182
Hyster Company 146

Industrial Brownhoist Corp.....119
Industrial Machy. & Supply Co..181
Industrial Plants Corp.....179
Inland Equipment Co.....180
International Harvester Co..... 43
*Iowa Manufacturing Co..... 5
Iron & Steel Products.....180

*Jackson & Church Co.....129
*Jaeger Machine Co.....147
*Jeffrey Mfg. Co..... 57
Judd & Son.....174

Kansas City Hay Press Co.....172
*Kennedy-Van Saun Mfg. & Engr. Corp. 20-21
Kent Machine Co.....139
Koehring Company 44

Lane Co., The T. J.....182
*Laughlin Co., The Thomas.....111
*LeTourneau, Inc., R. G..... 16
Lima Locomotive Works, Inc....163
*Link-Belt Co. 171
Lubriplate Division, Fiske Bros. Refining Co. 122
Ludlow-Saylor Wire Co. .....Inside Front Cover

*Machin Co., The E. C.....125
Mack Trucks, Inc.....158
*Macmillan Petroleum Corp..... 58
Master Builders Co.....143
McCartney Machy Co.....180
*McLanahan & Stone Corp.....172
Medusa Portland Cement Co.....147
*Merrick Scale Co.....126
Mine & Smelter Supply Co.....115
Mir-O-Col Alloy Co.....164
Monmouth Stone Co.....180
Mott Core Drilling Co.....172
*Multiplex Concrete Machy. Co...146
Murphy Diesel Co.....103

*National Supply Co., The..... 31
*National Wire Cloth Co., Inc....145
*Naylor Pipe Co.....104
Neff & Fry Co.....173
New Holland Machine Co.....109
*Nordberg Mfg. Co..... 18
Northwest Engineering Co..... 13

O'Neill, A. J.....185
Osgood Company, The.....157
*Owen Bucket Co.....170

Pacific Constructors, Inc.....175
Pennsylvania Drilling Co.....174
Philadelphia Gear Works, Inc.....172
Purdy Co., The.....181, 185

*Quaker Rubber Corp.....159
Quinn Wire & Iron Works.....147
*Raybestos Division of Raybestos-Manhattan 172
*Raymond Pulv. Div.....154
Rental Equipment Co.....179
Republic Rubber Div.....101
*Rogers Iron Works Co..... 40
Ryerson & Son, Inc., Jos. T.... 97
*St. Regis Paper Co..... 42
*Sasgen Derrick Co.....172
*Sauerman Bros., Inc.....120
*Schaffer Poidometer Co.....124
Schoonmaker, Co., A. G.....185
Schoonmaker, Robert 182
*Schramm, Inc. 63
*Screen Equipment Co., Inc.....167
Seitzinger's Sons, Thomas F....173
Sheppard Co., The R. H.....169
SKF Industries, Inc.....127
*Sly Mfg. Co., The W. W..... 99
*Smidth & Co., F. L..... 54
Smith Engineering Works..... 59
Socony-Vacuum Oil Co., Inc....6-7
Southern Iron & Equipment Co...181
Sprout, Waldron & Co., Inc.....175
Standard Oil of California..... 50
Stanhope, Inc., R. C.....181
*Stearns Mfg. Co.....148
*Stephens-Adamson Mfg. Co..... 30
*Sturtevant Mill Co..... 12
*Syntron Company 139

Taylor Forge & Pipe Works.....156
Telford Equipment Co.....181
Texas Company, The..... 61
Thermoid Rubber, Division of Thermoid Co. 47
Thew Shovel Co..... 4
Thornton Tamden Co.....141
Towmotor Corporation 138
*Trackson Company 24
*Traylor Engineering & Mfg. Co.. 9
*Truck Engineering Corp.....163
Truk-Loder Co.....171
*Twin City Iron & Wire Co.....172
*Tyler Co., The W. S.....169

Union Wire Rope Corp.....10, 11
Universal-Atlas Cement Co.....130
Universal Concrete Pipe Co... ..145
*Universal Engineering Corp.....153
Universal Road Machy. Co.....168
*Universal Vibrating Screen Co...173
*Universagt & Sons, G. A.....183

Van der Horst Corporation of America 152

Walsh Co., Richard P.....185
Webber Equipment Co.....187
Wellman Co., S. K.....173
*Wellman Engineering Co.....161
*Western Precipitation Corp..... 46
*Wickwire Spencer Steel Co..... 19
*Williams Pat. Crusher & Pulverizer Company 162
Willson Products Incorporated....107
Wisconsin Motor Corp.....119
Wood Industries, Inc., Gar..... 23
Wood's Sons Co., T. B..... 51
*Worthington Pump and Machinery Corp..188—Outside Back Cover

***See also Detailed Information in 1945 Pit and Quarry HANDBOOK**

Worthington-Ransome Blue Brute Distributors

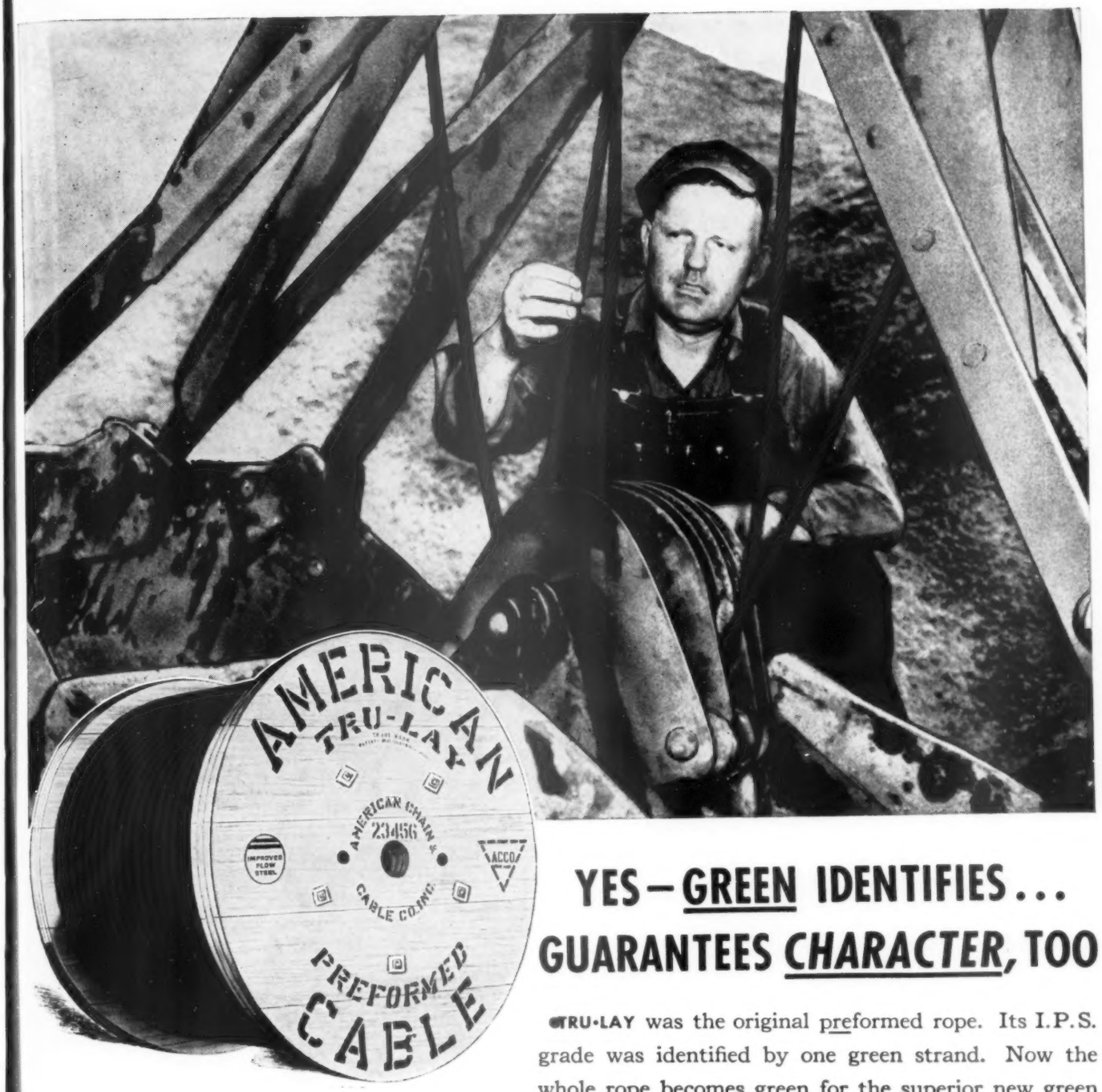
By referring to the advertisement on Back Cover, you'll learn the meaning of the (1), (2) or (1-2) beside their names.

Ala., Birmingham (1) J. D. Pittman Tractor Co.
Ariz., Phoenix (2) Smith Booth Usher Co.
Ark., Fort Smith (2) R. A. Young & Son
Little Rock (1) Kern-Limerick, Inc.
Little Rock (2) R. A. Young & Son
Calif., Los Angeles (1) Garlinghouse Bros.
Los Angeles (2) Smith Booth Usher Co.
San Francisco (2) Coast Equipment Co.
Colo., Denver (2) John N. Meade
Denver (1-2) Power Equipment Co.
Conn., Hartford (2) The Holmes-Talcott Co.
New Haven (1) W. I. Clark
Waterbury (1) Contractors Supply Co.
Del., Smyrna (1) King-Burrous
D. C., Washington (1) M. A. Doetsch Machinery Co.
Fla., Jacksonville (1) Julien P. Benjamin, Inc.
Tampa (2) S. M. Regar
Ga., Atlanta (2) Tractor & Machinery Co.
Savannah (1) Morgans, Inc.
Ida., Boise (1-2) Olson Manufacturing Co.
Ill., Chicago (1-2) Chicago Construction Equipment Co
Chicago (2) John A. Roche
Chicago (1) Thomas Hoist Co.
Ind., Fort Wayne (1) American Steel Supply Co.
Indianapolis (2) Reid-Holcomb Co.
Iowa, Des Moines (2) Electric Eng. & Const. Co.
Ky., Harlan (2) Hall Equipment Sales Co.
Louisville (2) T. C. Coleman & Son
Louisville (2) Williams Tractor Co.
Paducah (1) Henry A. Petter Supply Co.
La., New Orleans (1) Ole K. Olson Co.
New Orleans (2) Wm. F. Surgi Equipment Co.
Maine, Portland (1-2) Maine Truck-Tractor Co.
Md., Baltimore (1) Stuart M. Christhilf & Co.
Baltimore (2) D. C. Elphinstone, Inc.
Mass., Boston, Allston (1-2) Clark-Wilcox Co.
Cambridge (2) W. W. Field & Son, Inc.
Mich., Detroit (1) T. G. Abrams
Detroit (2) W. H. Anderson Co., Inc.
Flint (2) Gransden-Hall & Co.
Muskegon (1-2) Lakeshore Machinery & Supply Co.
Minn., Minneapolis (1-2) Phillippi-Murphy Equipt. Co.
St. Paul (2) D. L. O'Brien
Miss., Jackson (1) Jackson Road Equipment Co.
Mo., Clayton (1-2) The Howard Corporation
Kansas City (1) Brown-Strauss Corp.
Kansas City (2) Machinery & Supplies Co.
St. Louis (2) W. H. Reaves
Neb., Lincoln (1) Highway Equipment & Supply Co.
N. J., Hillside (2) P. A. Drobach
Newark (1) Johnson & Dealaman
North Bergen (2) American Air Compressor Corp.
N. M., Albuquerque (2) Bud Fisher Co.
Albuquerque (1) Morrow & Co.
Roswell (2) Smith Machinery Co.
N. Y., Albany (1-2) Milton-Hale Machinery Co.
Buffalo (2) Dow & Co., Inc.
New York (2) Air Compressor Rental & Sales
New York (1-2) Hodge & Hammond Inc.
New York (1-2) Railroad Materials Corporation
Olean (2) Freeborn Equipment Co.
N. C., Raleigh (2) Carolina Tractor & Equipment Co.
N. D., Fargo (1-2) Smith Commercial Body Works, Inc.
O., Cincinnati (2) Finn Equipment Co.
Cleveland (2) S. M. Clancey
Cleveland (1) H. B. Fuller Equipment Co.
Cleveland (2) Gibson-Stewart Co.
Marietta (2) Northwest Supply & Equipment Co.
Toledo (1) Edmund Supply Co.
Toledo (2) M. W. Kilcorse & Co.
Okla., Oklahoma City (2) Townsco Equipment Co.
Oregon, Portland (2) Andrews Equipment Service
Pa., Allentown (2) H. N. Crowder, Jr., Inc.
Easton (2) Sears & Bowers
Harrisburg (2) N. A. Coulter
Oil City (2) Freeborn Equipment Co.
Philadelphia (1) Giles & Ransome
Philadelphia (2) Metalweld, Inc.
Pittsburgh (2) Atlas Equipment Corp.
Wilkes-Barre (2) Ensminger & Co.
Wilkinsburg (1) Arrow Supply Co.
York (2) George F. Motters Sons
S. C., Columbia (2) Smith Equipment Co.
Tenn., Knoxville (2) Wilson-Weesner-Wilkinson
Memphis (2) Tri-State Equipment Co.
Tex., Dallas (1) Service Equipment Co.
Dallas (2) Shaw Equipment Co.
El Paso (2) Equipment Supply Co.
El Paso (1) Mine and Smelter Supply Co.
Houston (2) Dye Welding Supply Co.
Houston (1) McCall Tractor & Equipment Co.
San Antonio (2) Patten Machinery Co.
San Antonio (1) San Antonio Machine & Supply Co.
Utah, Salt Lake City (1-2) Landes Engineering Co.
Vt., Barre (1-2) A. M. Flanders, Inc.
Va., Richmond (2) Highway Machinery & Supply Co.
Wash., Seattle (1) Columbia Equipment Co.
Seattle (2) Star Machinery Co.
Spokane (2) Andrews Equipment Service
Spokane (1) Columbia Equipment Co.
W. Va., Charleston (1) West Virginia Co.
Fairmont (2) Interstate Engineers & Constr., Inc.
Wisc., Milwaukee (1) Mekeel Engineering Co.
Wyoming, Cheyenne (2) Wilson Equipment & Supply Co.

Buy Blue Brutes

Worthington Pump and Machinery Corp.

Worthington-Ransome Construction Equipment Division
Holyoke, Massachusetts



The green color identifies I.P.S. The all-green rope guarantees highest character because it signifies **TRU•LAY** *Preformed of Improved Plow Steel.*

YES—GREEN IDENTIFIES... GUARANTEES *CHARACTER*, TOO

TRU•LAY was the original preformed rope. Its I.P.S. grade was identified by one green strand. Now the whole rope becomes green for the superior new green lubricant is literally "stuffed" into every strand to identify and protect this highest grade rope. There is nothing better nor longer wearing than **TRU•LAY** Preformed Improved Plow Steel—the all-green rope. Make certain your next wire rope is **TRU•LAY** all-green.

ARMY (E) NAVY

ACCO

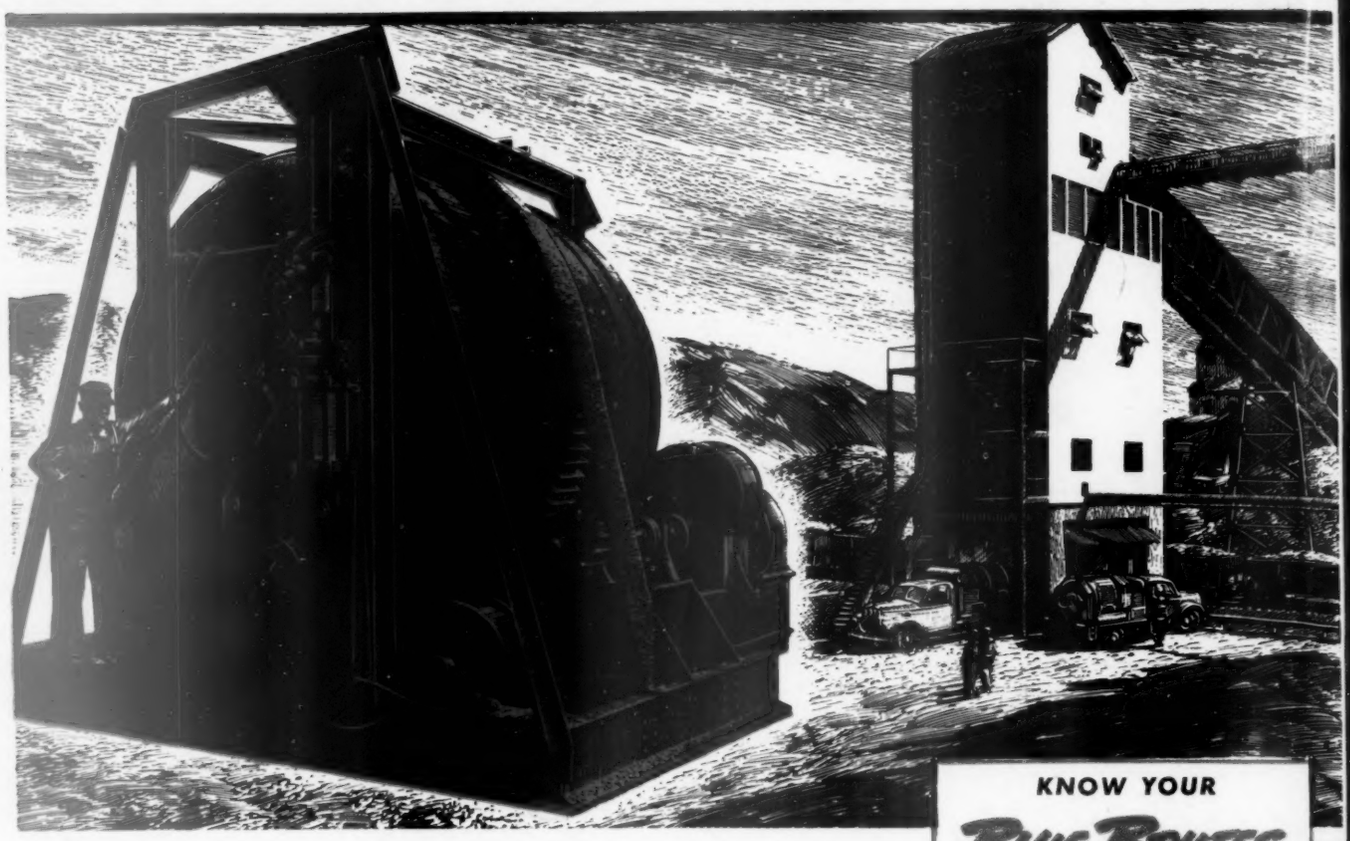
Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Bridgeport, Conn.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

ACCO TRADE MARK

In Business for Your Safety

BETTER CONCRETE IN BIG BATCHES AT LOWER COST



If you have your sights set on some of those big construction jobs that loom over the horizon, you'll want to investigate Ransome Blue Brute "Big" Mixers.

Look at their record: Ransome built the first "big" mixer back in 1902 for the U.S. Navy Dept. . . . has pioneered all major improvements ever since. Used for some of the world's outstanding construction projects they are first choice too, for central mix operators. A Blue Brute 126-S Mixer owned by Arundel-Brooks Corp. of Baltimore has mixed more than 2,000,000 yards and is still going strong.

Look at their features: Ransome's exclusive mixing action . . . fast, thorough . . . result of 96 years' mixing experience; spiral cut-off water tank and non-by-passing poppet valves . . . for the accurate water measuring that central mixing plants demand; hydraulically-operated discharge chute . . . simple, compact, trouble-free; car-wheel metal drum rollers and true-circle machined-tracks . . . for maintained accurate alignment of drum with driving mechanism.

Check these and the many other features that make Blue Brute "Big" Mixers your best bet for making better concrete at lower cost.

RB. 13

KNOW YOUR BLUE BRUTES

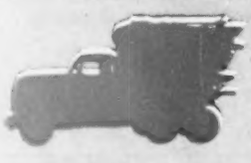
Your Blue Brute Distributor will gladly show you how Worthington-Ransome Blue Brute construction equipment will put your planning on a profitable basis and prove that *there's more worth in Worthington.* Act now! His name is listed on page 00. The number beside his name indicates the Blue Brutes he carries.

1.
Blue Brutes include: Pavers, Concrete Spreaders**, Concrete Mixers, Concrete Placing Equipment, Big Mixers, Finishing Machines**, Pneumatic Placing & Grouting Equipment, Truck Mixers, Plaster & Bituminous Mixers, and related equipment.

2.
Blue Brutes also include: Diesel, gasoline and electric driven Portable Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs; Rock Drills and Air Tools in a wide range of weights and sizes; Contractors' Pumps.**

**Proposed Products

BUY BLUE BRUTES



Truck Mixers
Capacities:
2, 3, 4½, 5½ cu. yds.

Portable Mixers
Capacities:
3½, 7, 10, 14 cu. ft.

Big Stationary Mixers
Capacities:
28, 56, 84, 126 cu. ft.

Pneumatic Placer
Capacity:
7, 14, 28 cu. ft.

WORTHINGTON

*Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division
Holyoke, Mass.